

The Mining Journal

LONDON, NOVEMBER 28, 1958

Vol. 251. No. 6432.

Price Ninepence

For Efficient SCREENING

CLEAN AND
ACCURATE
PERFORATIONS

MAXIMUM
OUTPUT

PROLONGED
SERVICE

Tough, durable screen plates made from "Harco" Perforated Metal are the answer to difficult screening problems. Their clean, accurate perforations will enable maximum output to be maintained over long periods, and their long life will effect a saving in replacement and maintenance charges.

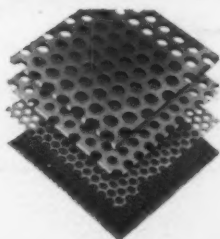
Screen plates can be supplied either flat or curved, and our wide range of patterns enables the most rigid sizing specification to be met.

**'HARCO'
PERFORATED
METALS**

Any pattern

Any gauge

Any metal

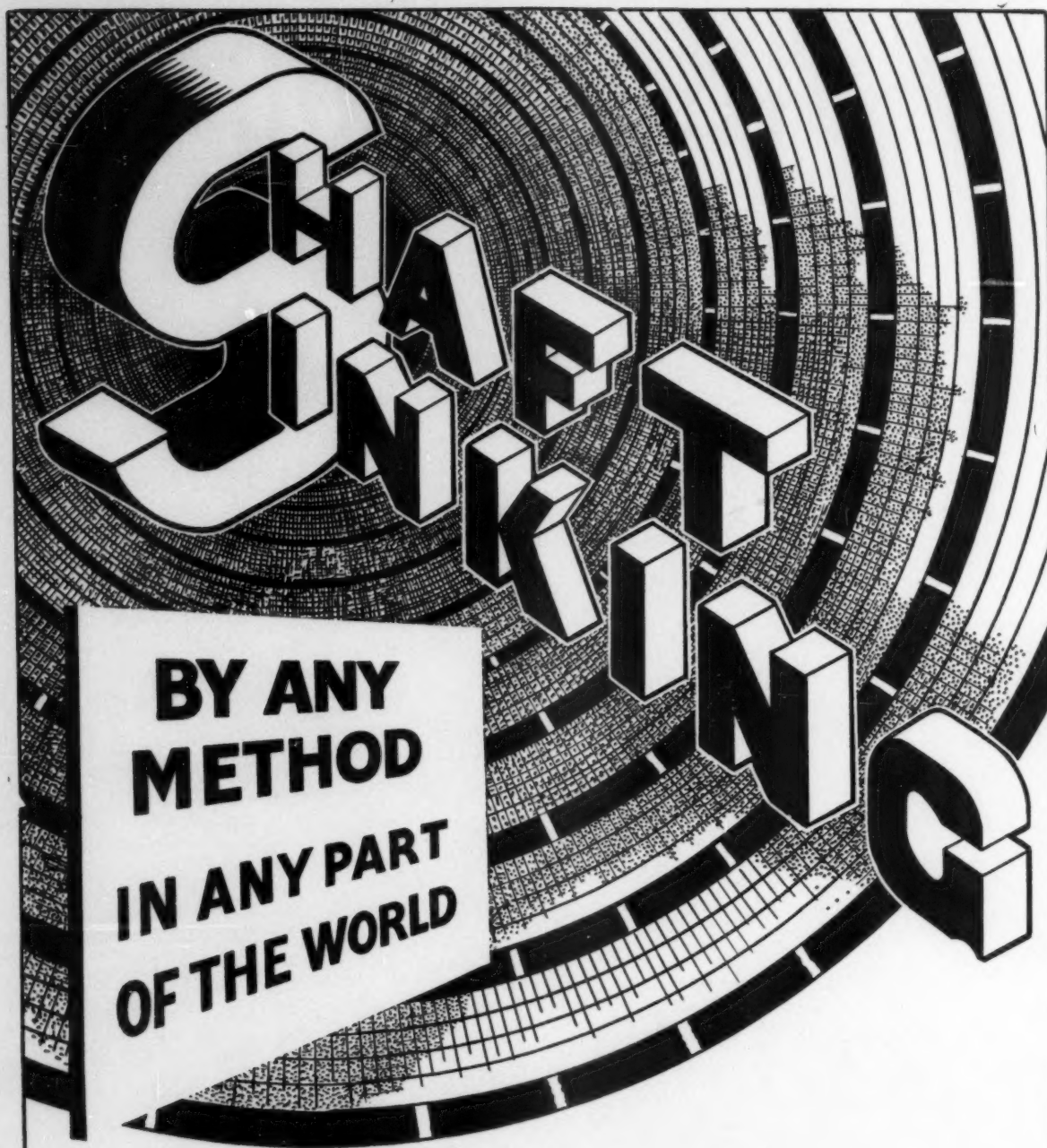


Patterns are shown in Catalogue No. MJ 926 — free on request.

G. A. HARVEY & CO. (LONDON) LTD., WOOLWICH RD., LONDON, S.E.7, ENGLAND

Telephone: GREenwich 3232 (22 lines).

Telegrams: 'Cheaper, London, S.E.7'



BENTLEY WORKS, DONCASTER.

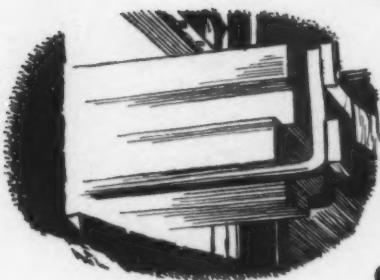
Tel.: DONCASTER 54175 and 54136

Research

Speed, efficiency, quicker handling and furnace charging and all-round saving in time and money—these are the benefits which the new T-shaped ALCAN* ingot have brought to the aluminium fabricators.



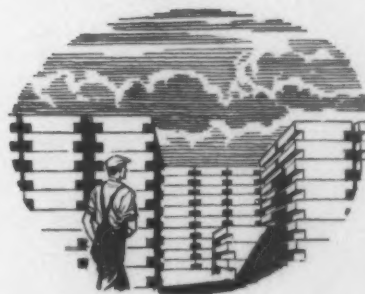
cuts an



This 'T' ingot saves storage space. 18,000 lb. of T-shape ingot have been safely stacked in an area suitable for only 10,000 lb. of the normal 50 pound ingot. Loading time is consequently cut. The new ingot is shaped like a flattened 'T' and is designed to fit squarely in the tines of a fork lift truck. Customers report that their loading time has been cut by 50%.

industry's

Produced by precision chill casting, this ingot is part of an active programme which aims at cutting an industry's costs. Whether your problem is casting, rolling, extruding, anodising or structural fabrication, the Aluminium Limited Group have the facilities to help you solve your problem.

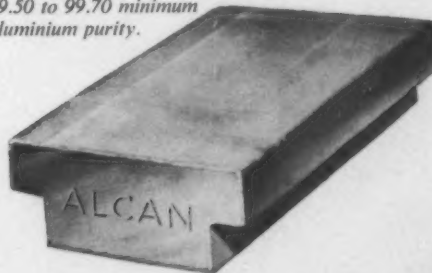


costs

Aluminium is our business. We back every pound we sell with development, research and service.

*ALCAN—The Aluminum Company of Canada Ltd., principal producing company of the Aluminium Limited Group.

The ALCAN 'T' Ingot.
Technical Details:
Weight: 1500 and 750 lb.
Composition: Alcan commercial metal in grade from 99.50 to 99.70 minimum aluminium purity.



If you would like to take advantage of these facilities why not consult—

Aluminium Union Limited
(Incorporated in Canada)



THE ADELPHI · JOHN ADAM STREET · LONDON · W.C.2.
OFFICES, ASSOCIATED COMPANIES AND AGENTS THROUGHOUT THE WORLD

An Aluminium Limited Company



*Return Your
USED DIAMOND BITS
of all makes*

TO
L. M. VAN MOPPE & SONS (DIAMOND TOOLS) LTD
BASINGSTOKE • HAMPSHIRE • ENGLAND
Telephone: Basingstoke 1240 • Telegrams: Diatipt, Basingstoke

FOR CONVERSION INTO A VALUABLE DIADRIL ASSET

DENVER HYDROCLASSIFIER

The finest machine available for all de-sliming and fine sizing problems



Inset photograph shows two 30' Denver Hydroclassifiers employed by the Virginia Carolina Chemical Corporation.

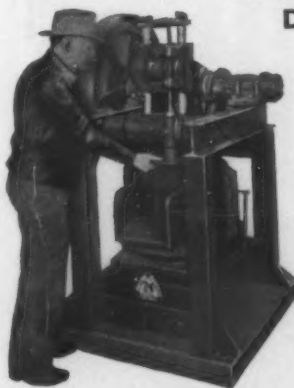
DENVER Hydroclassifiers are designed for 100 mesh and finer grind and where return of critical sizes to grinding is vital. They are ideal for use in ball mill and regrinding circuits and in all de-sliming operations. Rugged and well built, Denver Hydroclassifiers have opened up new processes in the flotation, cyanidation, chemical and industrial fields.

The exacting separation required for extremely fine sizes is ensured by accurate control of rake rotation speeds and rate of discharge, minimum agitation and a device which prevents the rakes from sanding up during shut-down.

Denver Hydroclassifiers can be supplied at almost any size to meet your particular need.

Write today for Bulletin No. C.4A-B2.

DENVER Adjustable Stroke DIAPHRAGM PUMPS



Denver Adjustable Stroke Diaphragm Pumps are in world wide use regulating and discharging pulps from thickeners and hydroclassifiers. Mounted above surge tanks they have also been found ideal for metering feed to flotation circuits at a constant yet controllable rate.

An outstanding feature is that the flow can be controlled whilst the pump is in operation. A few turns of a conveniently placed hand wheel will change the stroke from minimum to maximum and thus vary the volume of density of the discharge.

Denver Diaphragm Pumps are strongly built and are available in a number of sizes.

Write for illustrated bulletin P.8-B.



"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT CO. LTD

15-17 CHRISTOPHER STREET · FINSBURY SQUARE · LONDON E.C.2.

Telephone: B1Shipgate 0636

Cables: 'DECOLON' London

FLOTATION ENGINEERS

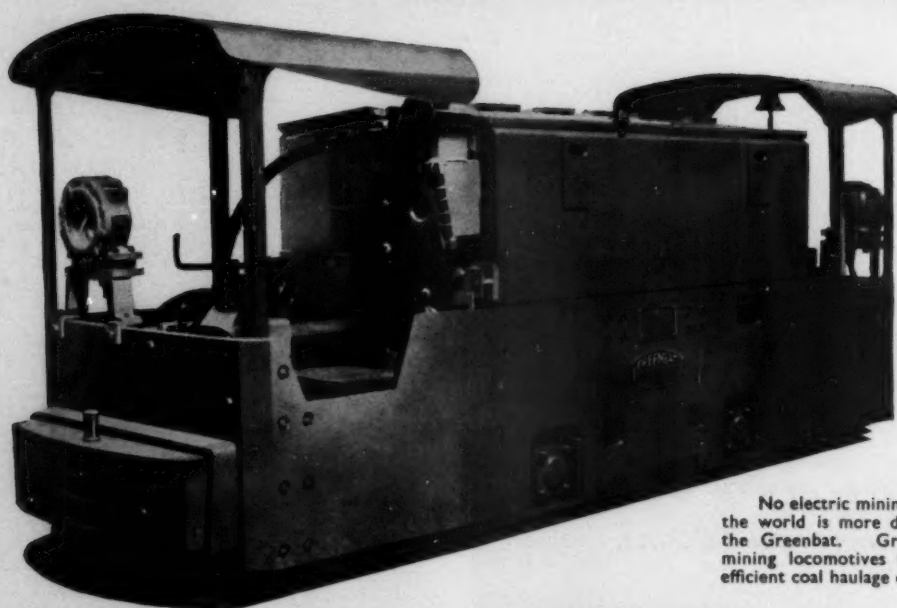
DENVER · NEW YORK · VANCOUVER · TORONTO · MEXICO D.F. · LONDON · JOHANNESBURG

GREENBAT

Electric

Mining

Locos



No electric mining locomotive in the world is more dependable than the Greenbat. Greenbat are the mining locomotives for continuous, efficient coal haulage or man riding.

GREENWOOD & BATLEY LTD. ALBION WORKS, LEEDS

V

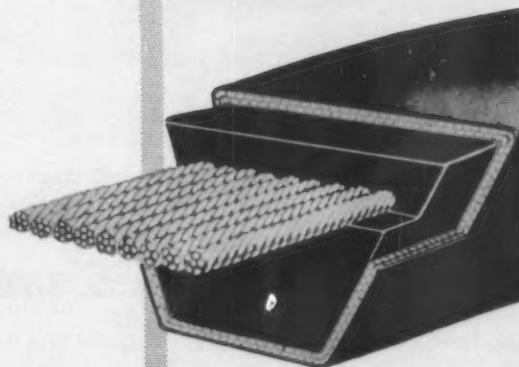
V-BELTS THAT ARE BUILT TO LAST!

YOU BUY ENDURANCE when you buy Goodyear V-Belts, made in types and sizes to suit every job from the largest multi-V installations to small F.H.P. drives. Longer belt life, more efficient transmission, less risk of costly shut-downs — these are the positive benefits of making good use of the Goodyear 'job-designed' range of belts which are backed by more than fifty years' experience in rubber engineering.

To be sure of longest, most economical performance it pays to consult Goodyear or your Goodyear Industrial Distributor, who will recommend a suitable belt, and also advise on installation and maintenance.



on multi-V Drives



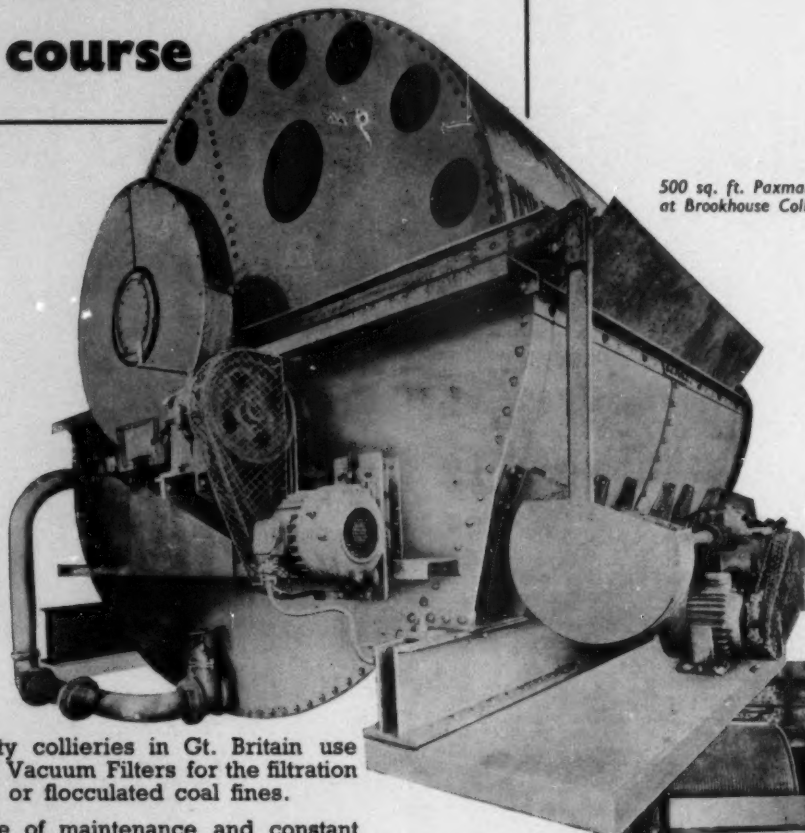
and on F.H.P. Drives

GOOD YEAR

V-Belts • Conveyor Belting • Transmission Belting • Hose • Fenders

THE GOODYEAR TYRE & RUBBER COMPANY (GREAT BRITAIN) LIMITED • WOLVERHAMPTON

**... for collieries,
Paxman Filters
of course**



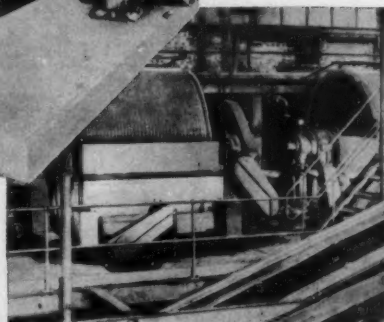
500 sq. ft. Paxman Filter installed
at Brookhouse Colliery.

More than sixty collieries in Gt. Britain use Paxman Rotary Vacuum Filters for the filtration of froth-floated or flocculated coal fines.

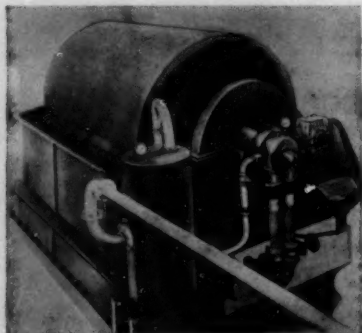
In design, ease of maintenance and constant efficiency, Paxman Rotary Vacuum Filters have achieved a unique reputation in the coal industry, as in many others.

DAVEY, PAXMAN & CO. LTD
COLCHESTER · ENGLAND

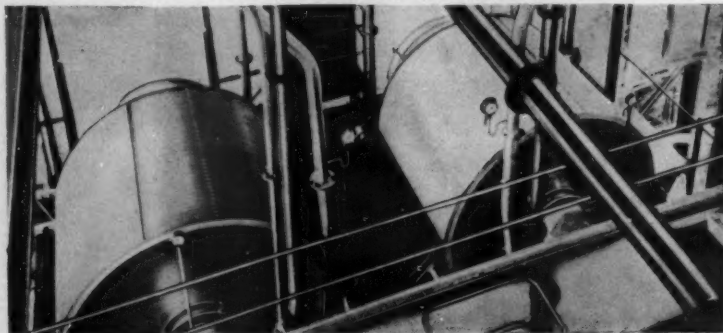
Telephone: Colchester 5151. Telegrams: Paxman, Colchester. Telex: 1875



Paxman Rotary Filter at the New Sharlston Colliery, nr. Wakefield, Yorks.



Paxman Rotary Filter for washed coal slurry, as supplied to Richard Thomas & Baldwins Ltd.



Paxman Rotary Filters for slurry filtration and dewatering at Allerton Bywater, nr. Leeds

ALSO MAKERS OF DIESEL ENGINES, BOILERS AND HEAVY FABRICATED METALWORK

The Mining Journal

London, November 28, 1958

In this issue . . .

Canadian Gold Glitters Again . . .	595
Can Price Fluctuations be Prevented? . . .	596
Moonward Ho! . . .	596
Exploitation of Israel's Mineral Resources . . .	597
Reappraisal of India's Five-Year Plan . . .	597
Australian Natural Gas . . .	597
Electromagnetic Prospecting in Sweden . . .	598
Iron from Pakistan Ore . . .	599
Mining Methods at Avoca . . .	600
Outsize Bauxite Ore Storage . . .	602
Research on Brake Linings . . .	603
Mining Miscellany . . .	604
Machinery and Equipment . . .	606
Metals and Minerals . . .	608
Mining Finance . . .	610
South African Gold and Uranium Producers . . .	611
London Metal and Ore Prices . . .	612
Book Reviews . . .	612
Company Meetings and Announcements . . .	613

Vol. 251

No. 6432

Established 1835

Editor

U. Baliol Scott

Deputy Editor

A. Graham Thomson

Assistant Editor

R. Bowan

Assistant Financial Editor

R. A. Nuttall

Display Advertisement Manager

E. S. Hooper

Circulation

Robert Budd

Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott
(Chairman)

U. Baliol Scott
(Managing)

G. A. Baliol Scott

R. A. Ellefsen

15 WILSON STREET,
LONDON, E.C.2

Telegraphic
Tutwork London

Telephone
MONarch 2567 (3 lines)

Annual Subscription £3

Single copy ninepence

Canadian Gold Glitters Again

FOR nearly twenty years the gold mining industry in Canada, as elsewhere, has been in the position of a swimmer battling against a powerful current, who has to struggle harder and harder in order to make any headway, or even to avoid being swept away.

For reasons which appear to be increasingly of a political rather than an economic nature, the price of gold has remained pegged at a level which has long ceased to bear any relation to commercial needs. Meanwhile, the prices of other commodities have been rising in inverse ratio to the declining purchasing power of most Free World currencies. Gold mining companies have accordingly been faced year by year with further increases in the costs of labour, equipment and stores, which could not be passed on to the buyers of their product. The difficulties of Canadian producers were further aggravated by an adverse exchange rate on the Canadian dollar. Some relief has been forthcoming in the form of a government subsidy, but E.G.M.A. is confined to those gold mines whose cost of production exceeds \$26.50 per oz. and has been no more than a palliative, though a very welcome one.

The tax tide has also been rising. At the annual meeting of Kerr-Addison Gold Mines in April this year, the president, Mr. James Y. Murdoch, told shareholders that in the past ten years taxes paid by their company in terms of net profit had increased from 31.7 per cent to 55.4 per cent. In addition, the government collected 10.4 per cent in payroll deductions at the mine, making their total take an amount equal to 65.8 per cent of the company's net profit.

Gold mining companies have sought to counter these adverse conditions by the more economical use of manpower and materials, but savings effected by improvements in efficiency have tended to be swallowed by further inflation. This year, however, higher dividend payments have been made by no fewer than five producers: Campbell Red Lake, Cochenoor Williams, Bralorne, New Dickenson, and Consolidated Discovery. The improved showings appear to have been due in at least three cases to developments of higher-grade ore; even so, it is evident that they could scarcely have been achieved by companies whose operations had not attained a high degree of efficiency.

In some respects, the outlook for Canada's gold industry was rather more favourable during the past twelve months. On the sales side, some relief was afforded in the latter part of 1957, when the Canadian dollar edged closer to parity with the U.S. dollar to give producers a return of \$34.42 per oz. of gold. The removal of government restrictions on the sale and ownership of gold has been at any rate a step in the right direction, though this action has brought no real benefits to the industry as a whole. On the production side, gold mines have been helped by the greater availability of labour, due to the slow-down in base metal activity, which has allowed them to be fully staffed.

A reminder—if such were needed—of the importance of gold mining to Canada's economy was afforded early in October by the ceremonial pouring of Kerr-Addison's five millionth oz. of gold.

This company started milling in 1938 at a rate of 500 tons daily; its operations have been expanded to the present rate of 4,500 tons daily, which makes Kerr-Addison Canada's largest gold mine at the present day.

From the start of milling up to the end of September this year, 4,998,000 oz. of gold and 265,000 oz. of silver valued at \$178,000,000 had been produced from 22,000,000 tons of ore milled. In order to develop and produce this ore, 92 miles of underground development work and 323 miles of diamond drilling have been completed.

Of greater significance from the Dominion's point of view is that wages and salaries paid in this period amounted to \$46,000,000, supplies and services purchased to \$48,000,000, and taxes paid to the Dominion, Provincial and Municipal authorities to \$26,200,000.

Kerr-Addison itself is engaged on an extensive programme of development and exploration, the development work being centred on the sinking of a shaft which by mid-year was nearly half-way to the present objective of 6,000 ft. Other gold producers have also been able to undertake heavy exploration and development programmes with satisfactory results.

In general, however, Canadian gold production has, not surprisingly, been declining for several years, while the unrealistic price of gold has inhibited the discovery and development of new mines. The improved production and earnings reflected in the higher dividend payments by several producers suggest that better times for the industry may at last be coming into sight. They should give a much needed stimulus to Canada's historic gold mining industry, which by virtue of the high efficiency resulting from the long struggle against adverse conditions, should be well placed to take full advantage of the higher gold price which, sooner or later, can scarcely fail to materialize.

CAN PRICE FLUCTUATIONS BE PREVENTED ?

The problem of price fluctuations is discussed by Metallgesellschaft A.G. in the introduction to the 45th annual issue of *Metal Statistics*, covering the period 1948-57.

During the period following the Second World War, the trend of metal prices frequently varied from day to day. Such uncertainty benefits neither producer nor consumer, it is pointed out. Countries in the process of development, whose export trade and balance of payments are largely dependent on the export of metal or metal ores, are particularly affected by big price variations.

Because of these continual fluctuations in metal prices and their effect on national economies and private business, producer and consumer organizations, as well as other national and international bodies, have been investigating ways and means of stabilizing prices. Various organizations, including the Raw Materials Commission of the United Nations, have been considering the feasibility of concluding international raw material agreements on various metals.

In considerations of this nature, states Metallgesellschaft, it is absolutely essential to decide whether, in fact, the principle shall be accepted that it is the function of prices to maintain the balance between supply and demand, or whether there are other and more effective methods of achieving this balance. Nor can the fact remain ignored that the violent fluctuations in the price of metals since the conclusion of World War II have been due, at least in part, to changes in the political situation. Restricted currency convertibility and changing exchange rates have also influenced metal price trends. The import and export of metals and metal ores have been, and still are in many countries, hampered by regulations of all kinds. It is not merely a question of customs duties, but involves

both import and export bans and quota restrictions. These measures hinder the achievement of a natural balance between supply and demand in the metal industry.

Attention is drawn to one of the factors which, in the past, has contributed to price fluctuations, namely a misconception of production potential and likely demand. It is emphasized that statistical publications, providing short-term (but adequate) reviews or surveys of developments in production, of demand and of metal stocks in all producer and consumer countries, could have a moderating effect on price movements and assist in the relation, in so far as this is possible, of production to demand.

The difficulty here encountered is that metal production is comparatively inelastic, because it is frequently a matter of years before the output of an existing mine can be raised, or a new mine can be brought to the production stage. Both smelters and refineries take a comparatively long time to erect. Nor is the decision to shut down mines or smelters and to limit production an easy one, inasmuch as heavy costs are involved in maintaining closed down installations in a state of preparedness to resume production at short notice. Hence the statistical data to be collated would have to cover the metal consuming branches of industry to enable any likely changes in demand to be foreseen well in advance. Discussions should also be held at regular intervals between metal producers and consumers, to facilitate accurate assessments of trends in the demand for individual metals.

The wisdom of our contemporary's observations can scarcely be gainsaid. The need for more efficient market research and, above all, for up-to-date and promptly available statistical information, is now widely accepted. On the principle that accurate diagnosis points the way to successful treatment, it might be said that some useful progress in this direction has already been achieved. Here, certainly, is a fruitful field for international collaboration between producers and consumers, since the accurate assessment of future demand is essential to any kind of forward planning.

MOONWARD HO !

Yet another indication that the age of space travel is fast approaching is afforded by a scale model of an aluminium building designed for use on the moon, which was recently displayed by a New York firm. Made of aluminium, it is designed to provide living quarters, shops and maintenance facilities for space vehicles on the moon. The company plans to present the model to officials of the military departments and the National Aeronautics and Space Agency, at the same time turning over to the United States Government all information and data on its research.

Designed specifically for lightness for air transportation, and for construction and use under unusual conditions, such as the sea of dust which would be found on the moon, the full-scale prototype would be built of a special aluminium alloy, which is still under development. The building would be 340 ft. long, 160 ft. wide, and 65 ft. high. Including air lock and plastic observation bubble, it would have a total length of 520 ft. Above the building, and separated from its roof, there would be a slightly curved umbrella-shaped protective meteoric shield, designed to ward off interplanetary dust.

Aluminium was selected for the moon building because it met the need for lightness and for the ease with which the metal can be fabricated. It also provides a good reflecting surface, which aids cooling problems.

Construction and fabrication of the building on the earth is estimated to cost about \$325,000, exclusive of any equipment or interior furnishings. No estimate of cost of transport into outer space is realistic at the present time. At the

present stage of rocket development, it is considered that up to 75 moon rockets would be required to transport a construction crew and the materials for such a building.

The moon building would provide: living quarters, including rooms for sleeping, cooking, eating, and recreation; physics, chemistry, and biological laboratories; a control tower; air-conditioning, heating, power, and refrigeration plants, oxygen-producing units, extreme temperature regulating devices, water supply, and sewage processing plants; machine shop and equipment maintenance areas. Inside the hermetically sealed building an air pressure of at least 10 lb./in.² would be maintained.

The scale on which this structure is conceived, together with the large number of rockets required to transport it, suggest that space travel, once it gets into its stride, should provide a useful market for the metals involved, among which aluminium is likely to be prominently represented. In this connection it need scarcely be pointed out that, once a moon-ship reaches outer space, it is unlikely to have any future value so far as the waste metal trades are concerned.

EXPLOITATION OF ISRAEL'S MINERAL RESOURCES

Sir Ben Lockspeiser, chairman of the Technological Advisory Committee of the Ministry of Development, has expressed the view that Israel's basic natural resources, mainly the deposits of potash, bromine, and phosphates, in the Negev area, should be exploited in a co-ordinated way. The development of these industries under an overall body would enable Israel to proceed towards the production of compound fertilizers and raw materials for the plastics industry. An overall body would facilitate the raising of investments in such projects. These views and Sir Ben's suggestion to establish a chemical combine in the vicinity of the Negev town of Dimona, near the various mining sites and close to Israel's main natural resources, were included in a comprehensive and detailed report, submitted to the Minister of Development by the members of the Advisory Committee. This committee, headed by Sir Ben, is jointly sponsored by the U.N. Technical Assistance Board and the Israel Government.

The introduction of the Report deals with the encouraging progress in production and productivity of the government corporations, and indicates a progressive consolidation of the enterprises directly concerned with the exploitation of the country's natural resources. A table is given from which the following items are extracted:

	1956-57	1957-58	Increase
Phosphates	615	698	13.5 %
Potash	101	185	85 %

Members of the Committee have been touring Israel for a fortnight, visiting and inspecting mines and factories, including the Timna Copper Works near Eilat, in the southern part of the Negev.

In respect of the phosphate output, the report states that it is anticipated to reach at the Oron works an annual rate of 250,000 tons in early 1959, when, as recommended earlier by the Committee, the flotation plant for turning out higher grade phosphorus pentoxide will start operation. Output at Oron works is at present increasing steadily, occasionally rising to some 20,000 tons a month.

A special chapter covers the activities of the Timna Copper Works, which had to go through some disturbing "teething troubles", but there are signs that this stage has largely been overcome, and the works have achieved by now about 50 per cent of the designed capacity. It is expected that the full daily yield of 1,500 tons of ore will be reached in 1959. The report suggests that the operations of this enterprise could be made more profitable by

producing, in addition to the relatively cheap copper cement, a certain proportion of blister copper and copper sulphate.

Some interesting details are given regarding the water problem which has arisen in the operation of the Timna Copper Works. The planned water consumption of these works, amounting to about 7,500 tons a day, exceeds considerably the available water resources. Daily output of the well is 5,000 tons of water. The report supports the recommendation made by the plant management that the demand of water could be economically supplemented by the purification of spent water, and a water recirculation installation will be put into service in 1959.

REAPPRAISAL OF INDIA'S FIVE-YEAR PLAN

In May, the Planning Commission of the Government of India published a paper entitled "Appraisal and Prospects of the Second Five-Year Plan". The Planning Commission's review contained a series of recommendations for the adjustment of expenditure under the different heads of Economic and Social Development in the light of revised estimates of the availability of external and internal resources.

These recommendations were endorsed by the National Development Council and have been the subject of detailed discussions between the Planning Commission and the various authorities concerned with the execution of sections of the plan. As a result, it has been found necessary to modify further the revised allocations set out in the paper published in May.

These modifications are described and explained in a second review recently published by the Planning Commission, entitled "Reappraisal of the Second Five-Year Plan—a Résumé". This reappraisal is in the nature of an interim report, since the programme for increasing financial resources during the last two years of the plan is still under discussion. The general effect is that, although the targets of production remain unchanged, the investment required to fulfil them is increased by about Rs.150 crores.

The largest increase is in the allocation for industrial and mineral development, which is raised from Rs.775 crores to Rs.867 crores. The Planning Commission explains that for certain projects cost estimates have had to be revised, while for others provisions larger than those originally made have become necessary.

The increase in the allocations for Mineral Development Schemes amounts to almost Rs.25 crores. Investment in coal production is increased by Rs.11½ crores. Nevertheless, the Planning Commission reiterates its earlier statement that there may be a shortfall of 750,000 tons in the planned production of 60,000,000 tons per annum by the end of the plan.

AUSTRALIAN NATURAL GAS

The Australian Oil and Gas Corporation in its annual report recently issued gives an optimistic forecast of the tapping of large deposits of natural gas under the Sydney Basin within the next twelve months. According to the report, plant and skilled personnel will shortly arrive from the U.S. to drill six bores for gas in the Camden-Penrith district near Sydney. This follows the favourable results obtained from four preliminary boreholes which gave appreciable showings of good quality natural gas.

It is not expected, however, that natural gas in Australia will prove so serious a rival for coal markets as in the U.S. The relatively low population of Australia and the huge size of the country militate against the introduction of large-scale pipeline systems.

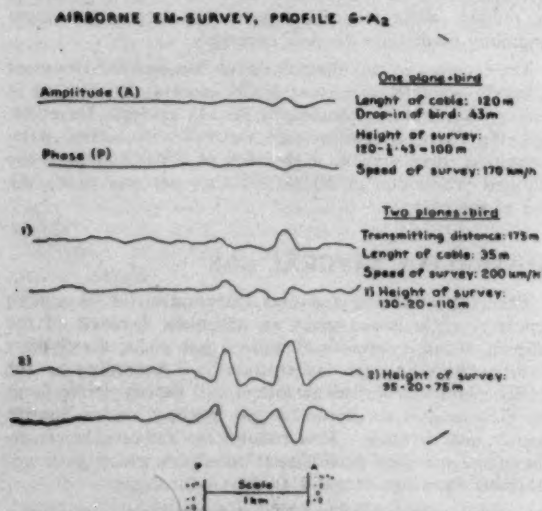
Electromagnetic Prospecting in Sweden

THE application of the airborne method to geophysical prospecting for ore and oil appears as a logical result of the modern endeavour to increase the speed and reduce the costs of all industrial undertakings. Aeromagnetic surveying can already be considered as a rather well-established method, but in electromagnetic prospecting the principles and technique of the airborne work are still under discussion.

In ground work the best known electromagnetic methods are based on the principle of compensation. An audio frequency alternating primary field is set up by means of a transmitting system comprising a solenoid, a cable loop or a straight grounded cable which is excited by an alternating current flow. The lines of force of the primary field penetrate into the rock and give rise to eddy currents in any electrical conductor therein. The field produced by such eddy currents has the same frequency as the primary field but may be more or less out of phase with the latter. The secondary field will cause local disturbances of the primary field and the corresponding anomalies can be detected by comparing the voltage induced by the total field in a receiving coil with a reference voltage transmitted by cable from the transmitter. When a solenoid is used as the transmitting coil it is very important that the mutual orientation and distance is determined with great accuracy since, for example, even a one per cent error in the distance will involve a three per cent error in the amplitude of the field being measured.

The Rotary Field Method

For methods which have been proposed for carrying out electromagnetic prospecting from aircraft the mutual changes in orientation and distance have involved great difficulties. The variations will necessarily be relatively great between an airborne transmitting coil mounted in an aircraft and a receiving coil towed behind the aircraft and, as mentioned, the amplitude of the field is very sensitive to the distance.



Three airborne registrations over the same conductors showing the increase of anomaly when changing from the one- to the two-plane system, as well as the influence of flight altitude on the size of indication.

The following article comprises an abstract from a paper presented by G. Tornqvist of A B Elektrisk Malmletning, Sweden, at the twelfth meeting of the European Association of Exploration Geophysicists in Brussels last year.

A system of fixed interlocated coils is, on the other hand, impractical to use because the distance between the coils is too small compared with the necessary altitude of flight. To overcome these difficulties very complicated arrangements involving a plurality of transmitting and receiving coils, "correction coils", follow up control of transmitting and receiving coil, etc. have been suggested. When recording only the phase angle there is no great technical problem but the resolving power of the method will then be substantially reduced. The simplified and improved method for airborne electromagnetic prospecting which has been used in Sweden and Canada is primarily characterized by the production of a rotating magnetic field. The anomalies produced in this field by electrical conductors within the area of exploration are recorded.

The Airborne Work

With the transmitting unit mounted in an aircraft the receiving coils can be mounted in a bird towed by the same aircraft. On account of the character of the rotary field, rotational movements of the bird about the Z-axis will cause no change in the phase or amplitude values.

The method of a bird towed on a long cable has, however, some definite disadvantages. Successful flights can be performed only in rather calm weather. Strong or even moderate wind or bumpy weather necessitate the flight to be done on a higher level otherwise the bird might hit the ground. The "noise level" of the registration will also increase under such conditions. For successful flights the relation between the size of anomalies and disturbances has to be kept above a certain minimum. As to the size of anomalies this depends mainly on the relation between the flight altitude and the transmitter-receiver distance, but it decreases very rapidly with the ratio between the vertical distance to the orebody and the transmitting distance. This is true both for the in-phase or real component (amplitude) and the out-of phase or imaginary component of the electromagnetic field.

The paper goes on to show that the anomalies caused by vertical lodes can be made to stand out more clearly only by increasing the separation between the transmitter and the receiver in respect to the flying altitude. This is impossible to accomplish with the method of trailing a bird on a cable. Longer cable needs higher altitude and gives higher noise level. On account of the character of the rotating field it can, however, be done by using two aircraft, one for the transmitting and one for the receiving unit.

The leading plane which carries the receiver has the bird with the coils hanging on a cable only 30 m. long and the following plane with the transmitter flies at the same height as the bird. Under the belly of the first plane there are spotlights which shine backward with a steady light when the

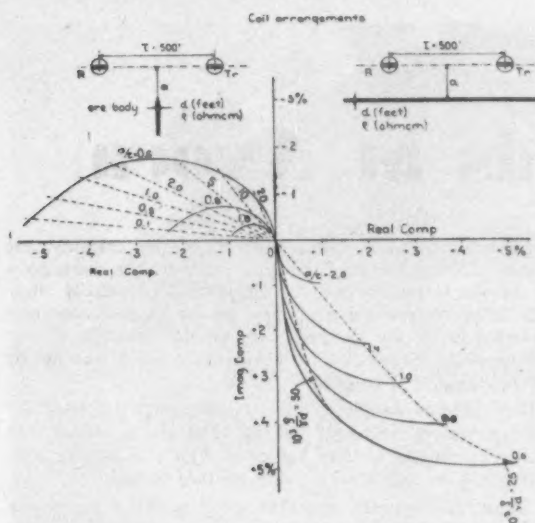


Diagram based on laboratory measurements showing size of maximum anomaly in the real and imaginary component to be obtained with the airborne rotary field method over vertical and horizontal sheetlike conductors.

distance between the planes is correct. That distance can be chosen to any value from 150 m. up to 330 m. With a system of winking light signals it is easy for the pilot in the second plane to keep the predetermined distance reasonably correct. As mentioned before the distance is in no way critical for the recording. When the first plane flies at an altitude of 100 m., which can be done without difficulties with such a short cable, the depth penetration will be very satisfactory and the anomalies of outcropping orebodies (under a normal layer of overburden) may be almost ten times larger than with the one-plane system.

Another advantage with the two-plane system is that the measurements can be carried out as soon as the weather permits of low altitude flying.

Practical Results

The airborne survey, which was carried out by ABEM in Sweden in 1956 with the rotary field method, comprised about 10,000 km. of profile. The lines were flown with a mutual distance of 250 m., partly with one plane towing a bird and partly with the two plane method. With a cable length of 120 m. and an altitude of 120 m. of the plane, which corresponds to about 100 m. for the mean height of the transmitter and the receiver, the indications were scarcely recognizable. With two planes and a bird at a height of 110 m. and a transmitting distance of 175 m. the anomalies were much more pronounced. When the altitude was reduced by 35 m. the anomalies increased considerably and reached 6 to 8 per cent in the amplitude and more than 3° in the phase. Much higher background noise could be tolerated in the last case.

The question might arise that the method is too sensitive so that the variation in the composition of overburden, or other topographical features, would cause too many indications. This is not the case, at least not in the geological surroundings like those in Sweden where generally non-conductive bedrock is overlain by moraine and other quaternary deposits. The line flown crosses a lake, a swamp, mountains, and a river and no anomalies exceeding regular background noise were registered. A dead powerline, a mine

in operation and a village cause weak to pronounced disturbances.

In this connection the importance of the measurement of the in-phase component must be stressed. If variations in the conductivity or the thickness of overburden cause an anomaly this will be practically only in the phase. As a rule the resistivity of the overburden is of the order of 100 ohm-meters or more. Experiments have shown that in the worst case a variation in thickness of 20 m. might cause a phase anomaly of up to 0.8° whereas the amplitude anomaly is always less than 0.2 per cent.

The indications obtained during the airborne survey were followed up by ground parties. The reconnaissance was made with an EMG-equipment and the detailed work with the Turam. The EMG consists of an oscillator, a transmitting coil and a receiving coil both in the form of staffs, and a compensator unit. The Turam method differs from the EMG mainly in that the primary field is sent by a fixed cable connected to a generator and the field variations in respect to amplitude and phase are measured with two interconnected coils or staffs.

The paper gives examples of airborne indications which were followed up by ground investigations and drilling. Two mineralized zones, about 50 m. apart, which were disclosed by the ground survey gave only one anomaly. From this example it is evident that drilling cannot be performed straight from airborne surveys but only after detailed work on the ground. Theoretical considerations and laboratory measurements indicate a possible application of the airborne method to the mapping of tectonics.

The following conclusion is reached : A relatively thick layer with a reasonably good conductivity (induction value less than 50 sec. ohm cm./foot) can, under favourable conditions, be traced down to a depth under the surface of 350 m. or even more when flying with two planes at a separation of 300 m. A variation of 50 m. in the depth will give an effect of roughly 0.5 per cent in either component of the rotary field. The resolving power is so far rather limited compared with the seismic reflection method, but it appears that for locating and mapping of near-surface structures which have a pronounced relief the airborne electromagnetic method should be considered as a valuable tool. Further developments to increase the accuracy of the method are under consideration. Clayey layers with electrolytes will of course be the easiest object for prospecting.

Iron from Pakistan Ore

FOR the first time iron has been produced from Pakistan iron ore by the Krupp-Ren process in the pilot plant of Fried Krupp at Rheinhausen in West Germany. Krupps have sent samples of this iron to the Pakistan Industrial Development Corporation.

It is estimated that Kalabagh and adjoining areas of Mianwali district in Pakistan contain 100,000,000 tons of iron ore deposits, and further prospecting is likely to reveal more. Prospecting is being conducted by the Corporation in these areas.

Mines are being organized for large-scale production of iron ore to meet the requirements of the steel mill at Multan. The plant will produce 69,000 tons of billets in the initial stage, and it is proposed to expand its capacity to 350,000 tons and later to 500,000 tons. The first stage will take three years to complete and will cost 170,000,000 rupees. With this plant in production, Pakistan will reduce her imports of billets by 50 per cent.

SAINT PATRICK'S COPPER MINES—II

Mining Methods at Avoca

THE two main lodes in the Ballygahan area, South and Pond Lodes, have been prepared for production to a depth of 100 ft. below sea level. Development of the downward extension of the lodes continues to open up new blocks of ore.

No shaft sinking is envisaged in the company's programme, access for hauling ore and for service to the mine being obtained by a 12 deg. downward incline of 16 ft. by 16 ft. driven in the footwall of the orebodies. This main haulage tunnel, which is perhaps the most outstanding feature of an unusual mine, has been advanced for 3,200 ft. and has a macadamized floor. The development openings for the ore extraction levels are also driven 16 ft. by 16 ft. These exceptionally large dimensions allow trucks of 30-ton capacity to haul ore from the working faces direct to the mill, which is situated 75 yds. from the portal leading to the mine, at speeds of up to 10 m.p.h. in the mine.

For development, loading and transportation of the ore to the mill, and for servicing the mine, diesel trackless equipment is used, most of it on rubber tyres. Traffic control is obtained by block signal lighting and passing points have been made at 500 ft. intervals.

The access system at Avoca is a notable example of the application of the "drive-in" technique to vertical lodes. The objective has been to make possible a highly mechanized operation which will bring working costs as close as possible to those of open-pit mining. Apart from the saving in initial investment, this system offers greater speed of access to the mining blocks and is expected to result in lower operating costs, as compared with shafts.

In order to keep within 150 ft. of the orebody, the tunnel makes a hairpin bend after 2,200 ft. and slants back across the lower footwall of the lode. Eventually there will be a second hairpin bend as the tunnel continues downwards to the deepest part of the orebody so far investigated. Cross cuts to the orebody are driven as the correct horizon is reached.

Drill jumbos on diesel crawler mountings are used for drilling, scaling, and roof bolting. The ore is loaded into trucks by mobile loaders equipped with side-tipping buckets of 2½ cu. yd. capacity, and by face shovels.

Minor development openings are 8 ft. by 8 ft. in size and are driven in the conventional manner with air leg drills, track-mounted overhead loaders, and scrapers.

Stoping

The earlier miners at Avoca took out 6 to 8 ft. of a high-grade streak on the footwall side of the lodes. Casual pillars were left and the old stopes were subsequently filled with material of economic value to present operations. The new mine is using the old workings to blast into the lode. Sub-level open-stope methods are employed. In the South Lode the transverse method of retreating has been adopted, the stopes being mined from the footwall

Operations at the mouth of the main adit





Caterpillar DW21 tractors with Athey PR21 rubber-tyred trailers are used for hauling spoil and rock from the mine shaft

side across the width of the deposit, which averages 150 ft. to the hanging wall.

The stopes are 200 ft. wide and the pillars 120 ft. This method of retreating the stopes is used mainly because the cut-out opening for initial mining already exists and a longitudinal retreat is not feasible. On the other hand, the Pond Lode development is longitudinal and is in the opposite direction, starting in the west and retreating eastwards.

The sub-level drifts are driven in ore, along the hanging wall of the mine, and are positioned at 60 ft. vertical intervals. Cross-cuts are opened as required across the orebody to the footwall, and from these 2½ in. dia. long holes are drilled for blasting, the holes being extension steel drilled and up to 120 ft. in length. A 7 ft. burden is put on to the rings. The total height of the upper mining block is 300 ft.

Access to the sub-levels is by way of the main incline tunnel, by old shafts which have been rehabilitated, and by raises from the main haulages.

Loading and Haulage

Ore is at present being blasted from the topmost levels, including the ground surface where the orebody outcrops in the eastern portion of the mining property. It is allowed to fall through the slots provided by the old stopes, which, as previously stated, were infilled by mineralized material of present-day ore grade.

All ore from the stopes is loaded from drawpoints, which lie along a half-mile long haulage way a few feet above sea-level. In keeping with the development openings, the drawpoints are also very large, being 35 ft. wide and 18 ft. high, with 20 ft. pillars between them. Caterpillar excavators with side-tipping mechanisms feed the ore on to 30-ton wagons, which haul the ore direct to the surface ore bin. Adequate manoeuvring space is thus available for the outsize vehicles employed in face shovel loading and a very high rate of loading can be achieved.

It is planned to obtain a still higher rate of loading by the installation of a portable conveyor 3 ft. wide, which will be positioned in the drawpoints at a suitable height for the wagons so that the side-tipping shovels can be discharged on to the conveyor and the time spent on loading and manoeuvring is reduced.

Future transportation from the deeper horizons has been so planned that, when the economic limit of truck transportations has been reached, the trucks will remain underground, bringing the ore to a gathering point for belt transportation to the surface.

Vehicles and Equipment

Loaders: A diesel-driven Lima with a bucket of 2½ cu. yd. capacity is employed on opencast operations. For feeding ore to the haulage wagons underground a Joy loader, 18HR model, and a Lorain face shovel of 1 cu. yd. capacity, both electrically driven, are employed together with two 977 Caterpillar Traxcavators with 2½ cu. yd. buckets which are equipped with Libu side-tipping mechanisms. There will also be an electrically-operated Smith PR21 of about ¾ cu. yd. capacity. The diesel equipment includes two Eimco 105s, one of which is being used as a loader while the other has been converted to a bulldozer; and one 955 Traxcavator, both fitted with the Libu side-tipping mechanism, one D6, which are used for stope extraction of muck and also for the main headings; and four Eimco 12B operated loaders for hauling muck in the sub-headings.

A 150 h.p. Sala 3-drum slusher, operated by remote control, is being used for hauling muck from the bin pile to the coarse ore bin on surface.

Transport vehicles: These include six PR21 Athey tractor trailers of 30 tons capacity, as well as three 15-ton Euclid S-7s, which have been used extensively in development tunnelling. For transporting men and materials the company employs 2-ton flat-deck trucks fitted with seats. A 2-ton truck with Simon's hydraulic platform is used for scaling, while the installation of pipes and ventilation ducting is carried out by means of a 2-ton truck with superstructure platform.

Drilling equipment: Two drill jumbos are employed on development work, these being mounted respectively on D7 and D4 chassis. There is also a hydro-boom rig mounted on a D4 tractor, which can take two 4½-in. drifters.

The drilling machines employed on development are Atlas BBD 41s, Holman Silver 3s, and Silver Bullet stope hammers. For stoping, Gardener Denver 4½-in. SFH 123 drifters are employed.

Pumping and Ventilation

The mine is being dewatered to a shaft bottoming well below the workings which will require to be mined for several years. This has been achieved by drilling drain-holes to old workings and the shaft. A 500-gallon per min. pump capable of lifting 1,000 ft. is located at the bottom of the shaft, together with auxiliary fixed pumping installations as required in the Ballygahan shaft workings. The mine is being dewatered at the rate of 400,000 gallons per day.

Ventilation is provided by two main forcing fans, located on the surface to the west of the present mining operations, through two vertical shafts located side by side and connected to the mine workings at depth. The shafts were sunk years ago to a considerable depth and will serve for ventilating the mine for years to come. The main fans

deliver well over 100,000 cu. ft. per min. to the lower workings for distribution upward.

Workshops, Water and Power

Underground workshops have been set up on or near the main working levels for complete servicing and maintenance of trucks, service vehicles, loading units, etc., in the mine.

The surface workshops, located at the mine entrance, are completely equipped to carry out repairs, overhauls, and general maintenance for the entire plant, surface and underground.

Water supply for the operation is obtained from the Avoca River. The two river pumps are capable of delivering 8,500,000 gallons a day.

Power from the mines comes in by high line from the Electricity Supply Board at 38,000 v. and is stepped down to 3,300 v. for distribution to the mill and mine, where it is further reduced for driving the smaller units to 380 v. The total plant capacity is 8,000 kVA., with total load for full production 10,000 h.p.

Compressed air capacity is 5,300 cu. ft. per min. at 100 p.s.i., taking 1,320 h.p. to operate at full load. One 140 h.p. hoist is operated to service the 900 ft. deep Ballygahan shaft.

Outsize Bauxite Ore Storage

CLAIMED to be one of the largest raw material storage buildings in America a new outsize aluminium structure has recently been taken into use by the Kaiser Aluminium and Chemical Corporation, at Gramercy, La., for the storage of moist bauxite ore.

This huge store is a clear-span, tepee-type structure, 783 ft. long, 204 ft. wide and 83 ft. high and is covered with 235,000 sq. ft. of corrugated aluminium box-ribbed roofing and cladding sheets. Designed by Kaiser engineers, it has semi-circular ends and sloped sides and roof to conform to the shape of the storage pile of ore. These provisions for maximum use of space make it possible to store up to 132,000 l. wet tons of bauxite ore.

The storage of moist bauxite ore in a building of this size made it necessary to incorporate maintenance-saving features and the aluminium sheeting used is able to withstand corrosion in most industrial and marine atmospheres and the need for costly initial and maintenance painting has been eliminated. Other provisions to reduce maintenance have included the elimination of light trusswork and laced members from the structural frame. Stiffeners on the main members were also reduced to an absolute minimum.

Comprising the main structural frames of the building are three hinged arches of built-up plate girders, 204 ft. in span and spaced 25 ft. on centre. The weight of the structure per sq. ft. of building is approximately 13.5 lb.

Ore is delivered to the top of the building by a 54-in. wide conveyor line and dumped on the pile by a remotely controlled reversible shuttle conveyor located at the roof ridge and running the length of the building. Recovery is effected through two reclaim tunnels.

The Aluminium Sheeting

Manufactured by Kaisers and installed by Elwin G. Smith and Co., Inc., Pittsburgh, Pa., the corrugated aluminium sheeting was .032 gauge with rib configuration 1½ in. deep, 5.33 in. pitch and 2.125 in. top and bottom flats. The sheeting has a stucco embossed finish and weighs about 63 lb. per 100 sq. ft. The metal was attached to purlins and struts spaced 7 ft. 3 in. on centre with 1½-in. long stainless steel, hex-headed, self-tapping screws with neoprene washers. For the side laps, ¾-in. screws were used.

Side laps of both roofing and cladding were laid with one corrugation lapped in the opposite direction to the prevailing wind. End laps for cladding were 4 to 6 in. and for roofing 6 to 8 in., with fastening directly to purlins.

The ends of the building are a series of flat-sloped pie-shapes, the end sheets being sheared diagonally. The end sheets were then completely covered with flashing.



Research on Brake Linings

ON Friday, November 21, 1958, His Royal Highness the Prince Philip, Duke of Edinburgh, K.G., performed the opening ceremony at the new Ferodo Research Laboratories, adjoining the Ferodo works at Chapel-en-le-Frith, in the High Peak district of Derbyshire.

The new building, which has cost the company £750,000 to build, brings together under one roof chemical and physics laboratories, a test-house, a garage for a fleet of test vehicles, a drawing office, workshops, an experimental production laboratory, library, conference room, and administrative offices.

The research and development on friction materials for which the new centre will be responsible, will benefit the mining industry by contributing to the still more efficient and dependable operation of mining machinery which must be brought to a safe stop.

The availability of friction materials able to withstand progressively more strenuous conditions has always kept pace with the demands of every advance in engineering design; indeed the aim of these laboratories is to keep several steps ahead of them. Their work is concerned in its basic aspects with answering two questions: (a) what is surface friction? (b) what is the structure of the raw materials of which conventional friction materials are made? On the development side, it is obviously concerned with the evolution, production, and evaluation of improved materials for existing and anticipated demands.

Fundamental Research

While our knowledge of the physical and chemical processes which take place within materials is considerable, study of the surfaces of solids has been relatively limited. Much of the original work in this field is being carried out in the Ferodo laboratories. A fundamental understanding of all the factors involved in surface friction would undoubtedly revolutionize our whole approach to brake lining manufacture.

The raw materials for conventional friction materials are asbestos, resin, and certain modifying agents. Of these, asbestos is the most important, combining as it does the heat resistance of a mineral with the strength and flexibility of a fibre. Research into the structure of asbestos is conducted in parallel with other investigations of its properties. Resins are used to bond together the constituents of a brake lining and give it the necessary physical properties.

Deciding what ingredients shall go into a brake lining is usually the joint concern of chemist and physicist, the one considering primarily the content and processing, the other friction and general physical properties. In most cases the starting point is information, either supplied by a customer or gathered by Ferodo technologists, about the level of friction required, temperatures and speed involved, mating surfaces, the braking system, and other factors having a bearing on the lining's behaviour. From past experience and with the information obtained by the research chemists and physicists, a tentative idea is obtained of the type of material required and the ingredients necessary to produce it. Small sample batches are then made up, some varying the proportions of raw materials, others the methods of processing. Detailed records are kept of all these variations.

When fully processed, the prototype linings are subjected to a series of frictional and other physical tests designed to reveal the strong points and weaknesses of each.

Tests on Linings

After a new experimental lining has been processed, it is most important that it should be tested under conditions closely simulating those it will encounter in service. Machine testing speeds development by eliminating many time-wasting factors. The machines used are inertia test dynamometers so proportioned that a complete brake can be mounted for test.

A typical control panel can operate a machine automatically at a number of speeds, time cycles, braking torques, cooling settings and times, all pre-selected over a sequence of 2,500 brakings. The latest panels are fitted with a triple dekatron counter, which automatically indicates braking times up to 10 sec. to the nearest 1/100 sec.

Until recently, conventional friction materials, based on asbestos, fulfilled all the demands made upon them for the control and transmission of power. Much modern earth-moving equipment, however, depends on clutches which must sustain duties beyond the scope of conventional linings and facings, and a similar problem faces the designers of other equipment, including tractor clutches. Alternative materials are required capable of retaining their strength and performance at the high temperatures produced in heavy-duty applications. Cast or wrought metals have the requisite strength, but have quite unsuitable friction and wear properties. A solution to the problem has been found in composite materials produced by powder metallurgy.

The introduction of a metallic phase into a ceramic body improves its ease of fabrication and mechanical properties. Compared with sintered metal linings, cerametallic friction materials have increased heat and wear resistance and a higher friction level.

Study of Factory Processes

Before full-scale production of new friction materials can begin, a great deal of work remains to be done to translate laboratory techniques into factory processes. An experimental production laboratory is, therefore, an essential part of the Research Centre. It contains more than a hundred machines, both standard factory equipment and prototype plant for new or improved processes.

New forms of braking and power transmission have an obvious impact on friction material development, just as the development of improved friction materials makes possible the design of more efficient or more compact brakes, clutches, and automatic transmissions. The ultimate development of new devices will depend on parallel research being undertaken by brake and clutch manufacturers on the one hand and in the Ferodo Research Centre on the other. It is unlikely that the newer friction materials will displace conventional asbestos-based materials; they will, however, facilitate the development of the heavy-duty equipment which modern mining and civil engineering demands.

MINING MISCELLANY

According to the annual report of the Danish Atomic Energy Commission, mineral deposits so far discovered in Greenland do not contain sufficient uranium to make mining worth while.

The Danish shipping firm of J. Lauritzen has bought up all Canadian shares in the Scandinavian company which mines lead and zinc in north Greenland. The Canadian company, Frobishers, formerly held 15 per cent of the shares, valued at about £112,500. Following this deal, 80 per cent of the share capital in the mining company is now Danish, the balance being held by Swedish interests.

In the next seven years Kazakhstan's copper output is to be raised two and a half times, according to the Premier, Mr. Kunayev, writing in *Pravda*. The expansion will be based mainly on the Dzhezkazgan deposits in the Karaganda area, which are the largest copper ore deposits in the U.S.S.R. Copper smelters and refineries will be set up on the spot and capital investments will be greatly increased.

Drilling on the Maranboy tinfield in the Northern Territory of Australia is to be extended. In announcing this development, the Minister for National Development, Senator W. H. Spooner, stated that it had followed an agreement between the Commonwealth Government and United Uranium, which held options over most of the leases in the field. The Bureau of Mineral Resources had drilled four holes on the adjoining Anaconda lease and was drilling a fifth. Diamond drilling tests had been made on the field since March, 1958. The Commonwealth had agreed to drill six more holes on two leases to test whether the field could be developed as a large-scale tin producer.

Mining activity in Oubangui-Chari, French Equatorial Africa, during the first half of 1958, has been marked by a new slackening off of diamond mining, and a minor resumption of gold production, which had practically ceased. Production of the former was 48,643.17 carats, against 60,334.77 carats during the first half of 1957. Gold production, which was virtually at a standstill during the first half of 1957, amounted to 18½ kg. this year. Exploitation of the uranium deposits at Mounana is said to have begun, and it is expected that the construction of a chemical processing plant can be put in hand.

The debate on the Bill for the abolition of mining concessions was opened in the Indonesian Parliament recently. The abolition applies to those concessions obtained before 1949, which, according to the government, "are not sufficiently exploited to secure the best results and are causing considerable damage to the State's interests". The Indonesian Government has stated that, of 2,400 mining concessions granted to private bodies before 1949, a total of 1,113 are held by Dutch citizens. The Bill provides that new concessions will be issued only to enterprises operating

on government capital. The Minister of Industries will be empowered to make exceptions with regard to mining concessions to oilfields so as to ensure the continuity of production.

A new mining company with an authorized capital of £50,000,000 has been registered in Accra. Its name is the Ghana Minerals Corporation. According to one of the four directors, Mr. Emil Savundra, £5,000,000 of capital has been paid up, and the corporation is being capitalized by a syndicate with Camp Bird group connections. The corporation intends to mine diamonds, gold, and manganese, as well as iron ore from the Yendi district of northern Ghana.

The Deputy Chief Inspector of Mines at Jos, Mr. F. A. Cassidy, has announced that more than 50 mining operators in Northern Nigeria are showing considerable interest in the mining of barytes found at Keama in the Lafia Division of Benue Province.

Operations may be resumed at Quebec Chibougamau Goldfield's mine in Canada, due to the recent advances in copper prices. Operations at the mine were suspended in November, 1957, because of the drastic decline in the price of copper. Some \$2,000,000 have been spent to date in diamond drilling, shaft sinking, underground development, plant construction and housing. This expenditure made it possible to outline a substantial copper-gold deposit.

Legislation has been approved whereby the National Bank of Cuba is authorized to operate any gold mines in Cuba, whose owners do not have them in production six months after receiving instructions to do so.

Kitchigama Syndicate, holding a wide spread of ground in the Mattagami district of Canada, has completed an arrangement with Noranda Mines, whereby the big copper producer finances a thorough exploration programme. Kitchigama was brought into being by the same six companies which compose the Mattagami Syndicate. They are Dome Mines, Leitch Gold, Area Mines, Iso Uranium, Highland-Bell, and Teck-Hughes. Under the arrangement with Noranda, the syndicate is repaid all its expenses for staking and preliminary exploration amounting to approximately \$50,000. Noranda has to pay the cost of the additional geophysical work and any diamond drilling that is necessary. If Noranda decides to proceed with development, a 3,000,000-share company is to be formed of which 600,000 shares would be issued to Kitchigama Syndicate. Noranda would be granted options on the balance of the stock to provide a total of \$5,000,000.

A new law has been published in Laos with the aim of encouraging foreign investment. It entails a large measure of exemption from tax, for a period of ten years, on customs duties, and on the profits of expanded or newly-formed industrial, agricultural, or mining com-

panies, whose activities might be deemed to be in conformity with the Laotian Development Plan.

Final construction contracts have been placed by Universal-Cyclops Steel Corporation of the U.S. for erection of a novel plant to produce molybdenum and other refractory metals and alloys. Ingots will be melted in a consumable arc argon atmosphere vacuum furnace. This plant is expected to be operating within a year. A prime contract for about \$3,000,000 was recently awarded to the company by the U.S. Navy Bureau of Aeronautics.

The Hollypark Coal mine in County Laois in the Republic of Ireland, which for many years has been producing coal for many parts of Leinster and Munster, is being offered for sale. The mine has been idle since last June when the miners, all of whom are members of the Irish Transport and General Workers' Union, went on strike because they were asked to accept a 23 per cent wage reduction to offset the loss of £1 a ton on production that the owners of the mine were incurring.

Store Norske Spitsbergen Coal Co. is reported to be having difficulties in disposing of its production. The North Norway market is declining. Coking trials of Spitzbergen coal made in Germany were said to have given good results. Rana Gruber, a State-owned mining company began working their large iron ore deposits in North Norway in October. In the first three quarters of 1958 Swedish iron ore shipments from Narvik totalled 6,000,000 tons.

In view of the project for establishing an aluminium plant in Guayana, the Minister of Mines of Venezuela, took steps recently to stimulate exploration activities for bauxite in the region. The Venezuelan Development Corporation has allocated Bs. 5,000,000 for the preliminary stages of the aluminium plant project.

Outokumpu Oy has announced that the Kotolahti nickel mine in Finland will come into production about the turn of the years 1959/60. It is estimated that annual production will be 300,000 tons and that the deposits will last ten years.

Following the discovery of large deposits of peat in the Faridpur district of East Pakistan, the chairman of the P.I.D.C., has stated that a German firm specializing in carbonization has been asked to send a team of experts to examine the possibility of converting peat into coke. If successful, this would, he estimated, save Pakistan Rs. 3 to 4 crores a year on purchases of coal from India.

Under the Irish Government's new £220,000,000 Five-Year Plan, additional funds will be allocated to the Geological Survey Office to enable it to continue to enlarge the coal prospecting survey on which it is at present engaged, and to undertake intensive surveys for other

mineral deposits. Technical assistance grants will also be made towards the cost of private prospecting and development. New legislation to facilitate exploration for oil and natural gas is also being prepared.

A special commission has been appointed to manage the Naricual coal mines in Venezuela. One of its technical advisers is a British coal mining expert provided two years ago by U.N.T.A.A. A market has to be found for the mines' output until the coking plant at the national steelworks is ready in about two years' time. Meanwhile, 200,000 tons of coke will have to be imported.

The decision to form a State Corporation in Ceylon to exploit kaolin deposits has been reviewed and it is likely that the Ceramics Corporation will, as a chief consumer, run such a factory. The original estimate of capital needs has been nearly doubled to Rs. 4,000,000. The project is expected to supply dust insecticide and kaolin for the paper and textile industry.

Kaiser Industries Corporation is considering a large programme of expansion in Brazil, and might go into aluminium, steel-making, shipbuilding, and dam construction. A geological survey of bauxite deposits is under way, and the feasibility of establishing 1,500,000 ton per year steel mill in the State of San Paulo is under study.

New installations for the Companhia Estanifera do Brasil were inaugurated at Volta Redonda recently. This plant, the first electrolytic tin refinery in South America, is expected to supply all of Brazil's requirements.

Thirteen of the modern General Electric Locomotives went into service recently on a railway operated by the Anglo-Lautaro Corporation in Northern Chile. The firm operates an industrial railway system as a part of its extensive nitrate mining operation.

PERSONAL

Mr. P. H. Mulcahy has been appointed general manager of Wemco, a division of the Western Machinery Co., of San Francisco, U.S.A.

The Goodyear Tyre and Rubber Co. (Great Britain) Ltd. have appointed Mr. T. F. Minter as manager of their Scottish plant at Garscadden, Glasgow.

The promotion of Mr. D. C. Altman to assistant managing director of Allis-Chalmers Great Britain Ltd. has been announced by Allis-Chalmers International, the parent company. Mr. Altman has been manager of Allis-Chalmers Great Britain Ltd. London sales office since 1955.

The Mond Nickel Fellowships Committee announced recently the award of a Fellowship for 1958 to the following applicants: Mr. G. H. Longworth, Lancashire Steel Manufacturing Co. Ltd., to study the manufacture of plain carbon and alloy steels for rod and wire products, in the United Kingdom, on the Continent, and in the United States; Mr. J. C. Morrison, Carron Co., to study melting, moulding and heat treatment of alloy cast irons, quality control of metal

and sand plants in modern foundries, and new developments in related metallurgical processes; and Mr. T. Tait, Colvilles Ltd., to study the technical and economic factors involved in the use of oxygen in steel industries in the United Kingdom, on the Continent, and in the United States and Canada. The Mond Nickel Fellowships Committee now invites applications for Fellowships of an approximate value of £900 to £1,200 for 1959.

COMPANY EVENTS

The name of Cuban-American Nickel Co., a Freeport Sulphur Co. subsidiary, has been changed to Freeport Nickel Co. A Delaware corporation with sales offices in New York, it will operate a refinery for nickel and cobalt at Port Nickel, Louisiana. To supply the refinery, Freeport Nickel's subsidiary, Moa Bay Mining Co., will mine and concentrate ores at Moa Bay in Cuba's Oriente province.

Gresham Developments Ltd., the specialist company of the Gresham Transformer Group Ltd., has moved to new premises at Thurlestone House, Uxbridge Road, Hampton Hill, Middlesex. The new telephone numbers are Molesey 4540, 6211, and 3059.

A separate division of Racal Engineering Ltd. has been formed to deal with all matters relating to their range of instruments. The new instrument division has its own development laboratories under the chief engineer, Mr. N. Elson, M.A., M.Sc., A.M.I.E.E., and also includes a special products section which will design, manufacture, and install digital or non-digital instrumentation schemes for special applications. Sales manager of the new instrument division is Mr. I. H. M. Campbell.

As from November 24, 1958, the telephone number of the Nottingham branch office of British Insulated Callender's Cables Ltd. has been altered to Nottingham 55932 (two lines). The address of the company's Carlisle branch office has been changed to Durrant Hill Industrial Estate, Harraby, Carlisle. The telephone number (Carlisle 22221) is unchanged.

CONFERENCES AND EXHIBITIONS

Experts from ten countries are at present meeting at the International Labour Organization headquarters in Geneva, on the international classification of radiographs of pneumoconiosis. The International Labour Organization has always maintained a close interest in the problems of pneumoconiosis, a disease to which workers are exposed who breathe dust, especially in quarries and mines.

The International Mineral Processing Congress, 1960, being arranged by the Institution of Mining and Metallurgy, is to take place at Church House, Westminster, London, from April 6 to April 9, 1960.

The next meeting of the Powder Metallurgy Joint Group of the Iron and Steel Institute, and the Institute of Metals will be held at Church House, London, on December 16 and 17, when there will be a symposium on "The

Powder Metallurgy of Ceramic-Metal Materials".

General Meetings of the Institute of Metals in session 1958-59 will be held on the following dates: February, April 14-17, April 15, May 7-9, and September 21-28.

The Annual Dinner of the Institution of Civil Engineers will take place on March 13, 1959, at the Royal Hotel, Cardiff.

Mr. H. Pritchard will speak on "The Electrical Aspects of the Continuous Miner at Trelewis Drift Mine", at a meeting of the South Wales Institute of Engineers to be held at Cardiff at 6 p.m. on March 19, 1959.

The South Wales Institute of Engineers will be meeting at Cardiff on April 23, 1959, at 6 p.m., when a lecture will be given on "Cynheidre No. 2 Winder Tower and Mine Car Circuit".

The next general meeting of the North Staffordshire Institute of Mining Engineers will be held on December 1, at 5.30 p.m., in the North Staffordshire Technical College.

The 21st International Congress of Industrial Chemistry organized in Liège by the Federation of Chemical Industries of Belgium, was attended by 1,300 people from more than thirty different countries. About 350 lectures and papers were presented on subjects covering the entire field of the chemical and para-chemical industries. The full texts of all lectures and papers presented at this Congress will be published in a special issue of the periodical *Industrie Chimique Belge—Belgische Chemische Industrie*.

A general meeting of members and associates of the Cornish Institute of Engineers will be held at the School of Mines, Camborne, at 7.15 p.m. on December 10, when a lecture entitled "The Technology of Titanium Pigments" will be given by Dr. F. R. Williams, B.Sc., F.R.I.C., of British Titan Products Co. Ltd. A film, "The Titanium Pigment Story", will also be shown.

CONTRACTS AND TENDERS

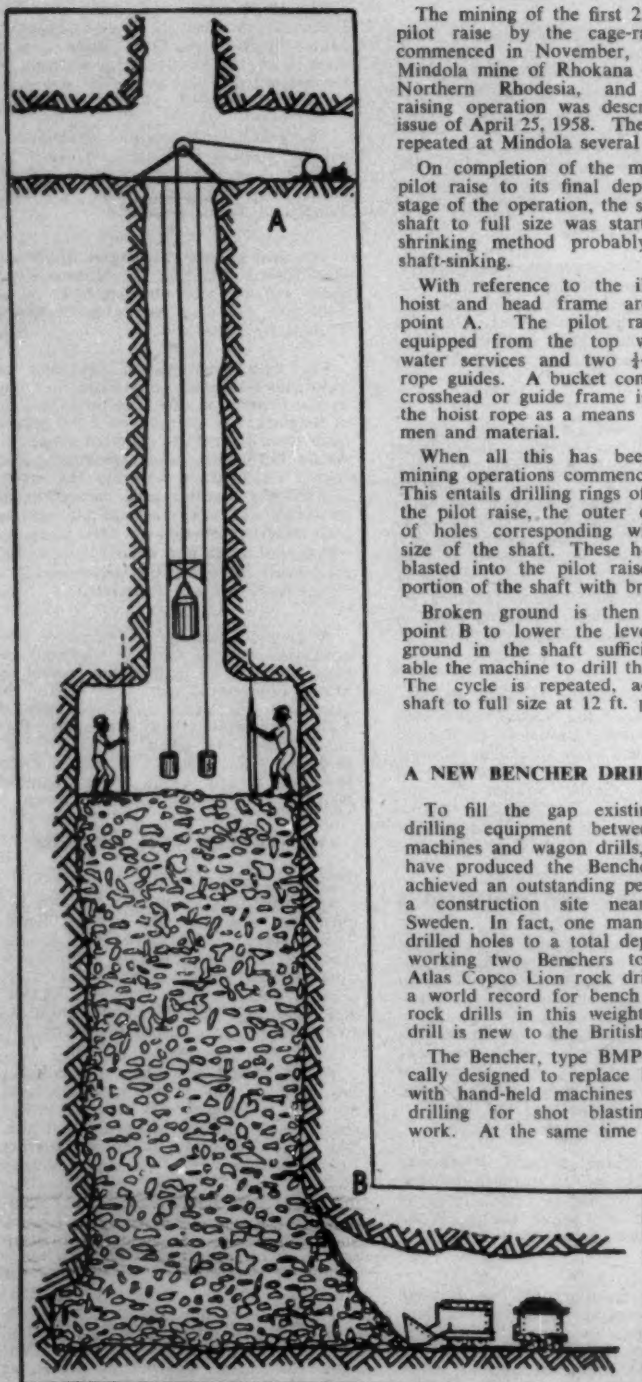
Portuguese East Africa

1,800 metres of conveyor belt for the chromium wharf of the port of Beira. Tender No. 1/AB/CFM/59. Issuing Authority: Ports, Railways and Transport Department, Lourenço Marques. Closing date, January 21, 1959. B.O.T. Ref. ESB/28333/58. Telephone inquiries to Chancery 4411, extension 738 or 771.

The General Electric Co., of the U.K., has received an order for a second 30 mW. turbo-generator for the power station of Mount Isa Mines in Australia. The value of the comprehensive contract for the construction of the power station awarded to G.E.C. now totals approximately £A5,000,000. The contract comprises boilers, buildings, cooling towers, and transmission equipment, in addition to the two generators. Climatic conditions at Mount Isa have led to the adoption of a completely outdoor arrangement for the power station, except for the air-conditioned control room. The contract will be carried out from the G.E.C. engineering works at Erith, Kent.

Machinery and Equipment

Sliping by the Shrinking Method on the Copperbelt



The mining of the first 250 ft. lift of pilot raise by the cage-raise method commenced in November, 1956, at the Mindola mine of Rhokana Corporation, Northern Rhodesia, and the cage-raising operation was described in our issue of April 25, 1958. The method was repeated at Mindola several times.

On completion of the mining of the pilot raise to its final depth, the next stage of the operation, the slipping of the shaft to full size was started, using a shrinking method probably unique in shaft-sinking.

With reference to the illustration, a hoist and head frame are erected at point A. The pilot raise is then equipped from the top with air and water services and two $\frac{1}{2}$ -in. weighted rope guides. A bucket complete with a crosshead or guide frame is attached to the hoist rope as a means of conveying men and material.

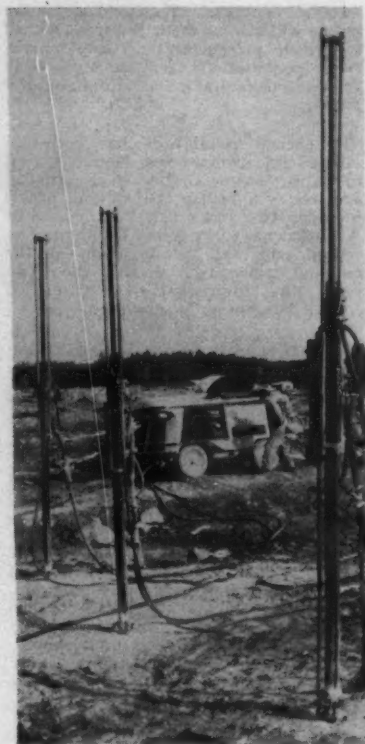
When all this has been completed mining operations commence at point B. This entails drilling rings of holes round the pilot raise, the outer circumference of holes corresponding with the final size of the shaft. These holes are then blasted into the pilot raise, filling this portion of the shaft with broken ground.

Broken ground is then removed at point B to lower the level of broken ground in the shaft sufficiently to enable the machine to drill the next round. The cycle is repeated, advancing the shaft to full size at 12 ft. per blast.

A NEW BENCHER DRILL

To fill the gap existing in bench drilling equipment between hand-held machines and wagon drills, Atlas Copco have produced the Bencher which has achieved an outstanding performance on a construction site near Stockholm, Sweden. In fact, one man in one shift drilled holes to a total depth of 735 ft. working two Benchers to power two Atlas Copco Lion rock drills—possibly a world record for bench drilling with rock drills in this weight class. The drill is new to the British Market.

The Bencher, type BMP-31, is specifically designed to replace bench drilling with hand-held machines in quarrying, drilling for shot blasting and road work. At the same time it is comple-



Three Atlas Copco Benchers powered by an Atlas Twin-Air Portable Rotary Screw Compressor. Each bencher is operating a Lion rock drill

mentary to wagon drills when terrain conditions make it difficult for transport or, on small scale projects where it is uneconomical to employ larger or more expensive equipment. To give optimum results the Bencher should be used in combination with a high capacity rock drill. It weighs 95 lb. excluding the rock drill with anchor bolt and 89 lb. excluding the rock drill without anchor bolt. Overall length is 7 ft. 3 $\frac{1}{2}$ in. contracted and 13 ft. 2 $\frac{1}{2}$ in. extended.

The feed length is 2 yd. (1.8 m.) and it is adapted for 1 $\frac{1}{4}$ yd. (1.6 m.) intervals drill steels of which Series 12 is appropriate. The 1 $\frac{1}{4}$ yd. (1.6 m.) intervals between the steel changes give one man opportunity to handle two machines at the same time. When drilling holes exceeding 11 yd. (10 m.) in length, 1-in. extension drill steel equipment should be used.

The equipment consists of three main parts, namely feeder, anchor bolt and rock drill. The feed movement is transmitted via two tie-rods connected to a double-acting piston rod which travels in an air cylinder. The cylinder has a bifurcated ring at the bottom which can be attached to the anchor bolt to form a knuckle joint. The rock drill is hung on the two tie-rods by the bracket normally used for the pusher leg.

A toggled clamp attached to the ringed end of the cylinder holds the drill steel steady when collaring. Suitable air feed pressure and direction of feed are obtained by means of a reducing valve at the top of the feed

cylinder. The square collar of the anchor bolt has a concave seat to accommodate the cylinder ring. A chained wedge when inserted through the eye in the anchor bolt head, forms the knuckle joint.

The grooved anchor bolt body is inserted in the drill hole and secured by driving down a wedge in the groove. The bolt has a rubber buffer to prevent it from entering too deeply. This will permit the bolt to be released by just tapping with a hammer.

Under normal working conditions one man can handle two machines simultaneously. The working procedure is as follows: two anchor bolt holes, about 8-in. (20 cm.) in depth, are drilled with a hand-held rock drill, e.g., RH-571 or RH-658. Anchor bolts and wedges are then placed in the holes and driven tight. The bench feed equipment is placed with the ringed end on the anchor bolt heads, the chained wedges inserted and the rock drills started. The complete moving procedure can be carried out in two minutes.

EARTH MOVING AT SHIPLEY

At the Plantation opencast coal site, Shipley, Derbyshire, W. J. Simms, Sons and Cooke Ltd., are the contractors operating a fleet of earth moving equipment comprising three Le Torneau-Westinghouse Model D Tournapulls, one Caterpillar D-8 tractor, and three RB excavators models 19, 43 and 54. The Tournapulls are used in handling of overburden exclusively. Excavation of the coal itself is by three RB machines.

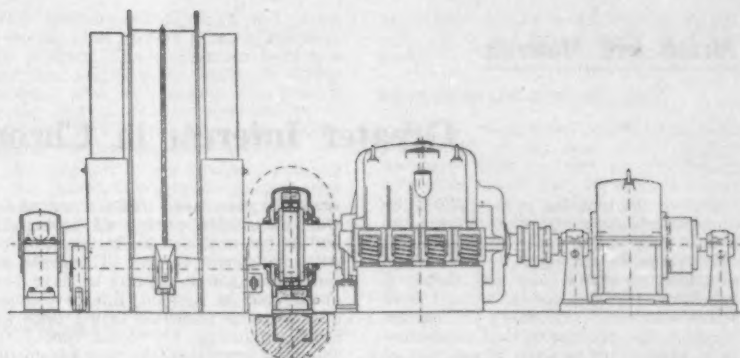
By using scrapers for overburden excavation and hauling, the contractors are able, without unnecessary handling, to meet automatically specifications which require that mined out areas be re-filled and restored suitable for agricultural purposes. The machines work a loop cycle in this connection. They load in the area where coal is to be exposed, haul downgrade into an adjacent previously worked out pit, spread their loads as fill and then swing about returning up to the cut area.

In the present location the scrapers must remove earth to a depth of about 25 ft. in order to expose the seam of coal. The seam when exposed will vary in the coal depth from 10 to 80 feet.

BEARINGS IN ORE MINE WINDERS

The LKAB iron ore mine at Kiirunavaara, in Northern Sweden, is equipped with eight underground crushing plants. Under each crushing plant there are two bunkers, each with a capacity of some 3,000 tons of ore. The ore is automatically discharged through a measuring hopper at the bottom of each bunker into the skips, which bring it up to the central dressing plant.

Eight winders are used for this purpose at Kiirunavaara, all identical Koepe type machines built by ASEA. Ward-Leonard control is used, providing good regulation of the winders and enabling the skips to be exactly positioned at the loading levels. The winders have a useful load per lift of 20 tons, a hoisting speed of 2,200 f.p.m. maximum, and a Koepe drum dia. of 10 ft. 6 in. They are equipped with four cables each of



General arrangement of motor, floating gearbox and cable drum of the ASEA ore mine winder. The bearing between the gearbox and the drum is mounted on the upset flange of the drum shaft

36 mm. dia., while the counterweight weighs 26 tons and skip weight is 16 tons.

Each winder is driven through an oil-lubricated precision gearbox by a d.c. motor rated at 1,150 h.p. and having a maximum speed of 750 r.p.m.

The non-drive end of the drum shaft is carried by a spherical roller bearing mounted on an adaptor sleeve, 23084 K+H 3084 (dimensions: 400×620×150 mm.). At the coupling end the shaft is carried by a spherical roller bearing 239/670 (dimensions: 670×900×170 mm.). The bearings are grease lubricated.

The shaft of the cable drum is coupled to the output shaft of the gearbox by a solid flanged coupling, and the 239/670 bearing mentioned above is mounted direct on the coupling flange by a method which has been jointly devised by SKF and ASEA. The design reduces the overall length of the winder and makes the coupling bearing readily accessible for inspection, and dismantling if necessary. The shaft of the cable drum and the output shaft of the gearbox thus form a mechanically rigid unit.

Since the cable drum shaft deflects under load, undesirable bending stresses would be set up in the shaft if the gearbox was rigidly supported. A "floating" mounting is therefore used, i.e. the gearbox is carried on 4 pairs of springs, to eliminate any such stresses. All the gearshafts are fitted with SKF bearings.

The layout and mechanical equipment of the LKAB mine has been described in *Ball Bearing Journal*, No. 4, 1957 and No. 8, 1958.

THE PUBLIC WORKS EXHIBITION

In our issue of November 14, 1958, a note describing the display of Armstrong Whitworth (Metal Industries) Ltd., at the Public Works and Municipal Services Congress and Exhibition, made mention of a new Size 15T sump pump, a Size 15D hammer drill, and a size 275 sludge pump. These specific equipments are manufactured by Armstrong Whitworth and Co. (Pneumatic Tools) Ltd. The Kue-Ken jaw crusher illustrated was, of course, the No. 95 unit.

Overburden removal and simultaneous site restoration at the Plantation opencast coal site at Shipley in Derbyshire. The illustration clearly shows all phases of the operation



Metals and Minerals

Greater Interest in Chrome Ore

Due to the time lag in the publication of comprehensive statistical reports, no precise and up-to-date information is available as to the extent to which consumption of many ores and metals is benefiting from the upturn in the United States economy. It stands to reason, however, that the rise in steel production from 55 per cent to some 75 per cent of capacity output must have been accompanied by corresponding improvements in the consumption of the ferro-alloy metals.

Tungsten, the hardest hit of the steel industry metals, has been the first to show any substantial measure of recovery. At the time of writing, wolfram ore shipment prices in London are indicated at 91s. to 96s. per l. ton unit c.i.f. Europe for minimum 65 per cent material, as compared with 85s. to 90s. a week ago. In accordance with earlier expectations, the price of ferro-tungsten in the United Kingdom has recently increased by 4d. to 8s. 3d. a lb.

There are now signs that the recovery may be spreading to other ferro-alloy metals. The demand for chrome ore at last shows signs of picking up, especially in the United States, where domestic consumption during August showed a gain of 27 per cent over July. Though the volume of fresh buying has not yet assumed sizeable proportions, it is encouraging that after months of slackness more interest is again being shown.

So far as the United Kingdom and the Continent are concerned, however, buyers are reported to be adopting a cautious attitude because of the prevailing Conference Line freight from Africa of 80s. per ton. Charter rates are considerably cheaper and buyers are believed to have covered some of their requirements at lower c.i.f. prices with shipments from other countries, such as Turkey. It remains to be seen whether in the course of the next few weeks the Conference Line rate will be reduced to a more realistic level. It is rumoured that talks have already started between the Rhodesian producers and the Conference Line with this end in view. Any freight reduction, it is thought, would probably operate as from January 1, 1959.

Meanwhile there is a steady, if unspectacular, demand for ferro-chrome. The contract price for 0.04 per cent carbon grade (average 68 to 70 per cent chrome) is indicated at 2s. 1½d. per lb. for the current quarter. Certain quantities of Soviet Bloc material continue to be available at cheaper prices. The effect of such offerings on contract prices for the first quarter of next year will doubtless depend very largely on the proportion of imports of Soviet Bloc material to total United Kingdom imports of ferro-chrome.

INDIA ABOLISHES MANGANESE ORE EXPORT DUTY

On November 24, the Indian Government announced its decision, with immediate effect, to abolish the much criticized export duty on all grades of manganese

ore. The rates were 10 Rs. a ton on ore with manganese content of between 42 and 44 per cent and 30 Rs. a ton on ore with manganese content of over 44 per cent. This action appears to have been unexpected in London, though rumours of a possible reduction in the rates had been circulating for some time. The complete removal of the rates has created a confused picture regarding c.i.f. prices.

There is some speculation as to whether this unexpected development might be tied up with the barter agreement under negotiation between the United States and India, which was recently reported to be approaching completion. Rumour has it that the quantity of ore and ferro-manganese to be bartered for United States wheat is now considerably bigger than the figures previously mentioned, which were 150,000 tons of ore and 75,000 tons of ferro-manganese.

PLATINUM PRICES CUT

With effect from November 25, Johnson, Matthey and Co. and Baker Platinum, the two leading refiners of platinum in the United Kingdom, have reduced the price of platinum to their regular customers to £19 10s. per troy oz. from £21 5s. The latter price had been in force since September 22. The two companies reduced their price in the United States by a similar amount at the end of last week.

The unsettled state of the market has been underlined for a long time past by the discounts obtainable in the free market, where prices were recently indicated at £18 5s. to £19 per oz.

A feature of the United States platinum trade has been exceptional activity in the futures market, on which the record number of sixty-four contracts was traded on Friday, November 21, each contract being for 50 troy oz. Prices ranged from \$54.50 to \$57.90 per oz. This unusually heavy trading in platinum futures, which recurred on the following Monday, though on a lesser scale, was generated by the United States Army's offering of 22,000 oz. of scrap platinum during the preceding two weeks. It is understood that the army's offering has been completely absorbed. Buyers are expected to try to redistribute the metal in New York over the next two months, including some for export.

It has been stated that Russian sales of platinum in the world market have now slowed down, possibly because of a belief that the price of platinum has reached its bottom. Earlier this year, Russia was undercutting Free World supplies by \$5 to \$10 per oz.

An official of Johnson, Matthey in New York was reported as stating that the outlook for platinum in 1960 was promising and that jewellery sales this autumn had been surprisingly good. The chemical, electrical, petroleum, and glass industries could now be expected to enlarge their purchases of platinum at or around the current price level.

Trade opinion in New York appears

to anticipate a gradual improvement later on, as the general business climate improves, but it would appear that to cause any significant upward movement in the price, there will have to be either a substantial improvement in demand or a reduction in both stocks and refinery output.

QUICKSILVER FALLS

The price of quicksilver has been reduced from £78 to £74 per flask for immediate delivery ex warehouse London. The price last changed on October 10, when it was lowered by £1 to £78.

The reduction was not unexpected, since shipment prices had been showing a progressively widening discount in relation to the £78 level. Now that the spot price has been reduced to a level more in line with current shipment ideas, this in turn will presumably depress c.i.f. rates still further. It was known that about 1,000 flasks of Italian metal were due to arrive in the United Kingdom shortly at cheaper prices. While most of it was reported to be earmarked already, the balance was presumably going into stock.

The recent cheaper offers for shipment, especially from Mexico, are believed to be linked to the near certainty that the United States General Service Administration's quicksilver buying programme for domestically produced and Mexican metal will not be continued beyond the end of this year. The G.S.A. support price is \$225 per flask at New York. Since Mexican metal carries an import duty of nearly \$20, this makes the G.S.A. price to Mexico about \$205, equivalent to about £73 5s.

U.S. PRODUCES MORE TITANIUM

According to the latest statistics issued by the Bureau of Mines, U.S. Department of the Interior, production of titanium sponge in the United States during the third quarter of the current year amounted to 1,173 s.tons against 718 tons in the preceding quarter and 4,191 tons in the corresponding quarter of last year. Consumption rose to 1,164 tons against 861 tons in the second quarter and 1,161 tons in the third quarter of last year. Output of titanium ingot in the third quarter reached 1,494 tons against 1,042 tons in the second quarter and 1,570 tons in the third quarter of 1957, while consumption was 1,315 tons against 987 and 1,799 tons.

Thus the titanium industry has made a substantial recovery in recent months, though it still has far to go before output is restored to the levels obtaining in the first quarter of 1958, when shipments of titanium mill products totalled 2,248 s.tons.

According to Mr. T. W. Lippert, director of marketing for Titanium Metals Corporation, in a recent interview with *American Metal Market*, titanium is being used in more and more new applications and has not been replaced in

existing applications. In his view, the most significant development in the titanium industry during the current year has been the change in markets. The airframe is now challenging the jet engine as the most important outlet because of the savings in weight that can be effected by substitution of titanium for assemblies once made of heavier materials.

Many new titanium alloys have appeared on the scene. Heat-treatment procedures have been developed for titanium bar and billet and heat-treated titanium products are now commercially available. Titanium welding procedures have been established; new products such as foil have recently appeared on the market.

It is becoming increasingly clear that titanium has an important future as a corrosion resistant metal. This is a field in the pioneering of which the mining industry is playing a leading role. International Nickel have included titanium in their general corrosion programme. During 1957, Freeport Sulphur placed orders for equipment for their Moa Bay

nickel recovery plant, which will result in the use of at least 15 s.tons of titanium mill product. The environment here is a corrosive and erosive slurry of dilute sulphuric acid, with metallic ions present in the slurry. Similar applications of titanium have been made by Calera Mining and National Lead.

The position of the titanium industry in the United States at the present time is summarized as: broadening markets, accelerated demand for technical service, and rapid introduction of new alloys and products.

NICKEL PLANT FOR CZECHOSLOVAKIA

Next year Czechoslovakia will start to build a nickel plant with completion scheduled for 1962. The plant will be situated at Sered in Slovakia and will be served by a natural gas pipeline. Ore will be supplied from Albanian deposits, which are understood to contain a nickel ore suitable for ammonium leaching. About 1,000 workers will eventually be employed by the plant.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Since writing the last report the whole atmosphere of the metal markets has undergone a complete change, as for the moment all feeling of optimism has disappeared except, perhaps, in the tin market. This change has been brought about by the sharp break on Wall Street which commenced last Friday and is still continuing. Although at a greatly decreased rate, this downward movement spread to Comex, where turnovers have been extremely heavy.

As is always the case with falling markets, consumers have withdrawn and weak bull positions have been liquidated. So far no general opinion has emerged on the immediate future of prices, but nearly everyone is agreed that there is unlikely to be any extreme movement in either direction.

SHORTAGE OF NEARBY COPPER EVAPORATING

The copper market, which at one time had fallen by as much as £20, when compared with the previous week, was subjected to heavy selling, and with the easing in the situation for nearby metal, had to go through the unsettling procedure of passing from a state of backwardation to that of contango. The weakness on Wall Street and Comex has given rise to two reductions in the customs smelter price, which now stands at 29 c. per lb. as against the 30 c. per lb. ruling last week, while the producers still maintain a price of 29 c. per lb. Consumer buying in the United States has tended to decline and the customs smelters' intake price for scrap has been reduced by fully 1 c. per lb. to 23½ c.

In the United Kingdom and Europe, consumers have become less anxious buyers, as it is becoming apparent that there will not be such a shortage of copper next month as had been at one time expected, and this is also indicated

by the development of a contango on the market. Partly, this situation has come about through the abolition of American export licensing for virgin and scrap copper, brass and aluminium to all destinations where strategic controls are not being enforced. It is this relaxation which has resulted in the disappearance of the backwardation, as United States copper is already arriving in this country. Strangely enough, it may also be a contributory factor in the customs smelter price, as it has been reported that as much as 8,000 s.tons of copper originally earmarked for Britain are now being re-offered in America because shipment has not yet taken place.

A second factor in easing the nearby position has been the Board of Trade, which has followed up its release of 10,000 l.tons at the beginning of this month with the announcement, in the midst of the weakness caused by falling markets, that it was releasing a further 7,500 tons for delivery by the middle of January, and that of this tonnage 3,000 tons were being offered back to producers' agents with the balance available on request. It is understood that the purpose behind using this method is to enable consumers who are short of particular shapes, sizes, and grades of copper, to purchase them from the Board of Trade, if they are available.

The Belgian producers reduced their price on Tuesday from the equivalent of 30.60 c. to 28.30 c. delivered Antwerp or New York. In the United Kingdom, stocks in official warehouses showed a slight increase of 125 tons at 6,221 tons.

Latest U.S. statistics continue to show an improvement, as the October copper consumption by mills based on shipments of fabricated products amounted to 138,916 s.tons against a revised figure for September of 105,474 s.tons. At the same time, unfilled orders rose and stocks in hand diminished. Against this, the mine production in the United States for

September showed an increase of 23 per cent above the August figure at 82,291 s.tons.

PREMIUM ON STRAITS TIN

The tin market has remained remarkably steady in the face of the general downward tendency and the offerings of cash metal which have been made during the period under review. The contango has remained fairly steady, but with a tendency to increase, and it seems possible that this state of affairs will continue. Stocks in official warehouses showed a slight increase of 111 tons at 17,393 tons, and a further rise is considered likely.

In the East, the daily offerings remain fairly constant, but as the present quota period draws to an end the tonnages on offer are liable to decrease considerably, which will probably have the effect of putting up the price. This relative shortage of Straits tin is giving rise to a large premium and is causing consumers to attempt to fill more of their requirements from other sources, such as Dutch and British.

General consumer demand has suffered along with that of the other metals, but is expected to pick up again immediately the price shows a definite firmer tendency, which is likely to be when other metal markets are also viewed more optimistically. During the week, the Russian delegate to the United Nations has said that his government is prepared to limit its exports of tin. Although this news has already been given indirectly, it is interesting to have it direct from official sources.

On Thursday morning, the Eastern price was equivalent to £787½ per ton c.i.f. Europe.

LEAD AND ZINC UNPREDICTABLE

The lead and zinc markets have been featureless and have been affected by the general atmosphere, the main development being the maintenance of the fairly large backwardation on zinc. Prospects for both metals are very obscure. It is impossible to find the majority who will agree on the immediate future in prices, and it is expected that in general the movements will be in sympathy with the copper price.

The Russian delegate to the United Nations has stated that his government is prepared to participate in discussions and schemes with a view to helping and stabilizing the prices of lead and zinc, and it will be interesting to see how such co-operation develops.

	Nov. 20		Nov. 27	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£239½	£240	£226	£226½
Three months ..	£237½	£237½	£226½	£226½
Settlement ..		£240		£226½
Week's turnover	11,825 tons		13,375 tons	
LEAD				
Current ½ month	£77	£77½	£74½	£74½
Three months ..	£77	£77½	£74½	£74½
Week's turnover	7,725 tons		5,175 tons	
TIN				
Cash	£761½	£762	£759	£760
Three months ..	£765	£765½	£762	£762½
Settlement ..		£762		£760
Week's turnover	1,095 tons		965 tons	
ZINC				
Current ½ month	£77½	£77½	£76½	£76½
Three months ..	£74½	£75	£72½	£73
Week's turnover	9,375 tons		8,150 tons	

London Metal and Ore Prices appear on page 612.

Mining Finance

The Tin Picture : Pahang's View

"The recent signs of strength in the tin market lead me to believe that now the buffer stock support has been withdrawn, natural market processes are at work, and consumers are once more encouraged to buy for their own stock. I further believe that, always providing world consumption is maintained at least at its present level and that effective control of production continues, conditions in the tin industry will show further signs of improvement in the not too distant future." These are the views of Mr. J. N. Davies, chairman of Pahang Consolidated, unique among the major Malayan tin producers in that the ore is won from underground, rather than by dredging, gravel pumping or hydraulicking.

The effects of tin restriction on Pahang can be traced throughout the report and accounts just published. Compared with 2,613 tons in 1956-7, only 1,810 tons of tin oxide were exported in the year ended July 31 last. Costs increased, in spite of economies in parts of the mill, because the plant ran for only 70 per cent of the possible time. Perhaps most revealing of all, the labour force declined from an average of 2,481 in 1956-7 to 1,641 at the end of the last financial year. Part of this fall was due to normal resignations and replacements, but over 400 employees, Chinese, Malays and Indians, had to be laid off.

Pahang's policy with regard to these retrenchments is worthy of note. One recurring theme in discussion of the tin situation has been the probable difficulty of reconcentrating a scattered labour force once conditions return to normal. Pahang's idea has been to avoid dispersal in the first place. The mine owns a large concession, used among other things, to supply the timber needed for the workings. Retrenched workers have been allowed, and indeed encouraged, to open subsistence gardens on good agricultural land within the concession with the company's assistance and government approval. They are also being allowed to continue living in the company's accommodation.

In view of the drastic readjustments necessary at the mine, the year's operating results are considered by Mr. Davies to be not unsatisfactory. After a much reduced taxation charge, reflecting the company's O.T.C. status, a small balance of £9,266 remained as net profit for the year. To this was added £129,000, representing taxation provisions no longer required. £115,000 was transferred to general and development reserve, and dividends, including the proposed distribution of 2½ per cent on the ordinary stock (last year: equiv. 18½ per cent), absorbed £18,400.

Net current assets at the end of the

year amounted to almost £800,000. At the current quotation of about 4s. 6d., the ordinary shares are an interesting buy for those prepared to put the shares away for a couple of years against a resurgence of business activity.

ARCTURUS IS GOING WELL

Coronation Syndicate, whose accounts for the year to June 30 last were published this week, derives income from two main sources—from the Homestake Gold Mining Co. (not to be confused with the Homestake Mining Co., the well-known U.S. gold producer) which tributes the Muriel mine from the parent company, and from Arcturus Mines. Both companies are wholly-owned subsidiaries of the Syndicate.

Until last year, the Homestake side of the business contributed much the larger part of Coronation's profits. One reason for this was the fact that the Tebekwe mine, which was operated by Homestake, continued to make profits, albeit small ones, until its closure in June, 1957, when pay ore was finally exhausted.

This year, however, has shown earnings from the two sources drawing much closer. This is due partly to the closure of Tebekwe, which, coupled with rising costs at Muriel and the decline in the price of by-product copper, has reduced Homestake's profits from £121,566 to £107,669. More important, however, is the rapidly improving position at Arcturus, which has raised working profits at that mine from £64,611 to £108,967 before depreciation.

The most important factor in the improvement at Arcturus has been the commissioning of the new reduction plant in January of last year. Now running more or less at capacity, the mill is processing about 7,000 tons monthly, almost double the rate of production in 1955-6. More than this, the plant has brought advantages over and above the actual increase in tonnage. Costs have been reduced—although the extent to which this has happened is obscured in this year's accounts by the effects of a reduced development footage—while an extra one dwt. of gold is being won by virtue of the increase in extraction efficiency from 79.3 to 90 per cent.

Meanwhile, development disclosures at Arcturus continue to be satisfactory, and this is true in spite of a fall in the ore reserves last year as a result of an unexplained cut in the rate of development, now restored. In particular, new sources of ore are coming into sight well beyond the Western extremity of the "Slate" mine, the origin at present of about 40 per cent of mill feed. Moreover, the new ore seems to be of rather higher values than the present reserve grade of 7.1 dwt.

Coronation are currently priced at about 4s. 3d. (their highest for the year). At this level the shares yield 5.5 per cent on the dividends for 1957-8 totalling 7d. (6½d. last year). For the time being, this

LONDON MARKET HIGHLIGHTS

The major event in share markets during the past week was the sharp break on Wall Street. Heavy selling in New York lowered the Dow Jones Index over 14 points—the largest one-day fall in more than three years—and was swiftly reflected in London, where losses in prices were also heavy and widespread. As far as South African gold shares were concerned, however, selling was relatively small.

This was surprising in that the collapse on Wall Street came at the end of a Stock Exchange account here which had previously seen a fairly sharp rise in gold shares. A recovery soon set in later when Wall Street began to show a tentative improvement. Just where Wall Street is going from here is a very open question, but the one thing that seems certain is that prices are not going to stand still. At the time of writing a general improvement in all sections of the London Stock Exchange is under way.

Among the newer gold mines, Free State Geduld (114s. 4½d.) and Western Holdings (115s. 7½d.) at one time both lost 1s. 10½d. and "Ofsits" came back 1s. to 79s. There were many other losses, of course, but these did not exceed 1s. or so in the main.

Diamonds lost ground, De Beers falling 2s. 6d. to 118s., while Platinsums were additionally upset by the rather unexpected reduction in the metal quotation.

Probably the most severely hit of min-

ing markets was the Copper section. Already rather uncertain of the stability of the metal price, the market later had to contend with an apparently ill-timed announcement from the Board of Trade to the effect that a further release of 7,500 tons of copper was planned. Messina dropped 3s. 1½d. to 58s. 1½d., R.S.T. 1s. 4½d. to 17s. and Selection Trust 3s. 1½d. to 91s. 10½d., among many other falls. Bancroft (24s.) were particularly depressed in view of the recent speculative buying based on hopes of what might happen when the mine is reopened (probably in April). It has never been forgotten that the shares touched 50s. last year. Strangely enough, Rhodesia-Katanga, whose Kansanshi mine is fairly confidently expected to be de-watered in the near future, have attracted little support. "Rho-Kats" reached 54s. last year; last week they were only 15s. 9d.

Tin shares held their ground fairly well. They were helped to some degree by a slightly dearer metal price and the news of unexpectedly maintained interim dividends from Ampat (7s. 7½d.) and Southern Kinta (18s. 6d.). Beralit, however, dropped 1s. 6d. to 30s. 6d. Among Lead-Zincs, Consolidated Zinc fell away to 54s. 9d.

Elsewhere, West African golds succumbed to the general trend and were particularly upset by the suggested Ghana-Guinea union.

would seem to fully value future possibilities.

The advance statement by the chairman of the Syndicate, Mr. S. F. Dench, is on page 613.

NEW CENTRAL WITS' PORTFOLIO

At the annual meeting of New Central Witwatersrand Areas last Tuesday, Mr. M. W. Rush, the chairman, revealed that there have been substantial alterations in the company's portfolio since the end of the financial year. In his advance statement with the accounts (M.J., November 7, 1958), Mr. Rush indicated that future policy would tend towards investment in a broader range of mining securities.

The portfolio as at November 25 was as follows:

Anglo American Ord.*	5,000
Buffelsfontein	10,000
Coronation Coll.*	7,500
De Beers, Def.*	6,000
General Mining Ord.	5,000
Grootvlei*	20,000
Hartebeest*	10,000
Middle Wits*	10,000
Ofsit	20,000
Rand Selection	5,000
R.S.T.*	10,000
St. Helena	6,500
Vaal Reefs	10,000
Writs	100,000

The investments marked with an asterisk appear in the portfolio for the first time. The cost has been met by reducing the investments in all the other companies in the list with the exception of General Mining and Writs. These changes in no way invalidate the conclusions reached in this column on November 7.

TANKS CENTRAL, AFRIKANDER LEASE AND ELLATON

An interesting situation has arisen with regard to the uranium produced by Afrikander Lease at the joint extraction plant on the property of Stilfontein Gold Mining. This is revealed by Mr. George Mackenzie in his advance statement to shareholders of Tanganyika Central Gold Mines, whose main interest is a 27.35 per cent holding of the equity of Afrikander Lease.

Until recently it had been thought that the only limitations imposed on Afrikander's uranium production were its allocation of capacity at the joint plant, and the grade of the ore which could be mined. The first of these factors was a constant, but the exceptionally high values encountered on the Rietkuil section led the company to believe that the rate of production could be trebled from the 1957 rate of about 120,000 lb. annually without increasing throughput.

When a limit was placed on purchases by the Combined Development Agency, however, the quota allocated to Afrikander Lease was only 117,800 tons. Representations were made on behalf of the company, and a solution was found through the agency of Ellaton Gold Mining. It is thought that Ellaton, whose shares have never been offered to the public, has only a few years of profitable life remaining. Subject to certain charges, it has therefore been agreed that when Ellaton ceases operations, Afrikander leases will take over that mine's quota of 124,000 tons until the end of the contract period in 1964. As an interim measure, Afrikander has been granted an additional quota of 60,000 lb.

This means that Afrikander now has a quota of 178,000 lb. per annum, which will be increased to 242,000 lb. when the Ellaton allocation is taken over.

Production in the quarter ended September 30 totalled almost 40,000 lb. This is 4,700 lb. below the quota rate, but the deficiency will be made up in the current quarter. Development results on Rietkuil continue to be excellent, with 86 per cent payability and values of 89 in. lb. disclosed in the September quarter. About 7,500 tons of ore per month are now coming from this section, and this quantity will increase as further connections from surface become available.

BURMA CORPORATION EARNINGS SHARPLY LOWER

Estimated net earnings of Burma Corporation (1951) in the year ended June 30, 1958, were K.11,55,900 (£86,693) compared with K.34,29,783 (£257,234) in the previous financial year. Burma Corporation is a joint-venture company owned equally by Burma Mines and the Union Government.

The fall in earnings is undoubtedly largely attributable to the low prices received by the company for its major products, lead and zinc and, to a lesser extent, copper. Another factor has been the disadvantageous effect of the Business Profits (Amendment) Act of 1957, which it is believed, was not intended to apply to the Burma Corporation. A Bill is now before the Burmese Parliament which, if passed, will remedy the position.

The quarterly report of Burma Mines, which includes a summary of the operations of Burma Corporation (1951) is on page 614.

GOOD YEAR FOR NORTH KALGURLI

The old-established Australian gold producer, North Kalgurli (1912), enjoyed a good year in 1957-8. This is clear from the circulated statement by the chairman, Mr. H. A. Kemlo, reproduced on page 613.

In recent years, N. Kalgurli has made much progress towards the twin goals of

independent operation and modernization. Independence has been attained by the consolidation and enlargement of treatment facilities at the Croesus plant. The last link with the old Kalgurli Ore Treatment plant was severed in May of this year, when North Kalgurli's interest in the Kalgurli Ore Treatment Co. was sold to Gold Mines of Kalgoorlie. The last ore was sent to the K.O.T. plant in 1956.

Modernization of the mine is still going ahead, and the company can now claim, with justification, that a high pitch of efficiency has been reached. The most recent step in this direction was taken when the addition of a post-cyanidation section to the Croesus plant was begun recently. This development, which will raise the mill recovery, is now well under way, and should be completed in the early part of next year. In the meantime, mine development is going ahead, centred on the extension of the new Main Shaft to 2,100 ft. Actual sinking is now complete, and work on equipping is proceeding.

A DYNAMIC LITTLE 'UN

Although the Liverpool-based Lampa Mining Co. is a comparatively small operator, other more powerful organizations could look with advantage at Lampa's annual report which, as well as being highly informative, reveals the dynamicism of this company which mines copper and silver in Peru.

This year in particular, Lampa shareholders have good reason for satisfaction with their management. In common with other base metal producers Lampa's margins in the year to June 30 were extremely narrow—at times non-existent, in fact—and this, coupled with a 20 per cent wage increase and an adverse movement in exchange rates, caused the net profit to fall to £1,819 against £56,737. In spite of this the board has proposed a final dividend of 10 per cent which, with the interim of 5 per cent, will cost £14,556 (20 per cent last year). Shareholders are now reaping the benefit of the board's providence in earlier, more prosperous years, when a large part of income was utilized in building up a strong balance sheet.

SOUTH AFRICAN GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for the first nine months of 1958 and 1957

Heading		January to September	Rand Cos.	Klerkadorp Cos.	G.F.S. Cos.	Total
Tons milled :	Millions	1958	36.5	4.8	7.7	49.0
		1957	38.1	4.5	7.3	49.9
Ounces produced :	Millions	1958	8.0	1.9	3.2	13.1
		1957	8.4	1.6	2.8	12.8
Grade per ton :	Dwt.	1958	4.2	7.8	8.2	5.2
		1957	4.2	7.3	7.6	5.0
Working costs per ton :	s.d.	1958	42/10	54/6	59/8	46/7
		1957	42/1	52/6	56/2	45/1
Working Profits	Gold : £m.	1958	18.1	10.4	16.6	45.1
		1957	19.8	8.8	14.5	43.1
Working Profits	Uranium : £m.	1958	15.8	7.5	4.7	28.0
		1957	13.5	6.3	4.6	24.4
Total Profits :	£m.	1958	33.9	17.9	21.3	73.1
		1957	33.3	15.1	19.1	67.5
Dividends declared : (net total)	£m.	1958	9.1	5.0	13.3	27.4
		1957	9.1	3.0	9.4	21.5
Non-European employees at end of Sept.		1958	231,000	39,000	64,000	334,000
		1957	227,000	34,000	55,000	316,000
No. of Companies included		1958	37	7	10	54
		1957	37	7	10	54

Another example of the progressiveness of this small company lies in its perseverance with its new "segregation" process. In recent years work has been pressed ahead on an experimental plant in spite of teething troubles, refractory ores and plain bad luck. Now, at last, it appears that the process is proved for working on a commercial scale. Mr. J. Shirley Esplen, the chairman, said that further lines of development are now suggested. He points out, however, that these would call for a heavy capital investment.

HOLMAN BROTHERS MEET DIFFICULTIES

Holman Brothers, who acquired Climax Rock Drill last year, have declared a dividend of 4 per cent—the same rate as was declared in the 1957-8 financial year.

In declaring the dividend, the company states that the difficult conditions encountered in the last financial year are continuing. These include a contraction in demand as a result of falling base metal prices, and the restriction of imports in several countries. A decrease in home sales has now added to the difficulties.

As a result of these factors, group profits are now running at a lower level than in the preceding year, and it appears unlikely that the results for the full year will be as good as those for 1957-8.

Tin Restriction Hits Chenderiang.

Profits of Chenderiang Tin Dredging in the year ended March 31 last were sharply lower at £5,230 against £16,343 in the previous year. A dividend of 5 per cent was recommended, compared with 20 per cent in 1956-7. In his advance statement Mr. J. Addinsell, chairman, says that tin restriction is causing

the company considerable hardship. Economies are being actively sought, but the company remains a high-cost producer. Meeting, December 27.

Canadian Uranium Profits.—Net profits of the five Canadian uranium producers under the aegis of Rio Tinto were as follows: Algom (nine months to September 30), \$7,347,000; Northspan (three months) (loss), \$3,156,000; Milliken Lake (three months) (loss), \$627,000; Rix-Athabaska (nine months), \$382,000; Pronto (nine months), \$2,113,000. All these figures are struck after deducting interest, taxes and pre- and post-production write-offs, and are subject to audit and year-end adjustments.

Freddie's Loan.—Freddie Consolidated have made arrangements to defer repayment of part of its loan of £1,000,000 from the National Finance Corporation. The instalments falling due in November and October, 1958, totalling £200,000, have been or will be repaid, but the balance of £800,000 will not now fall due for redemption until the period December, 1959 - April, 1960. During the period of deferment, interest will be charged at 5½ per cent. Johannesburg Consolidated will continue to guarantee the balance of the loan.

Sherritt Gordon Mines.—After all charges, net profit of Sherritt Gordon Mines during the first nine months of 1958 was \$2,557,276, compared with \$4,629,759 in the corresponding period of 1957. In a report accompanying the financial results, Mr. Eldon L. Brown, president and managing director, says that an arrangement has been made with Le Nickel S.A. under which the Sherritt Gordon refining process will be used in that company's new refinery at Le Havre. Sherritt Gordon has a similar arrangement with Freeport Sulphur.

LONDON METAL AND ORE PRICES, NOV. 27, 1958

METAL PRICES

Aluminium, 99.5%, £180 per ton.
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton.
Crude (70%) £190 per ton.
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.
Arsenic, £400 per ton.
Bismuth (min. 1 ton lots) 16s. 1b. nom.
Cadmium 9s. 6d. lb.
Cerium (99%) net, £16 0s. 1b. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 3d. per gram.
Gold, 250s. 4d.

Iridium, £20/£22 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £290
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton.
Osmium, £17/£18 oz. nom.
Osmiridium, nom.
Palladium, £5/£5 15s.
Platinum U.K. and Empire Refin. £19 10s. oz.
Imported £17 10s./£18 0s.
Quicksilver, £74 0s. ex-warehouse.
Rhodium, £40/£42 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 30s. 0d. per lb.
Silver, 76½d. f. oz. spot and 76½d. f'd.
Tellurium, 15s./16s. lb.

ORES AND OXIDES

Bismuth 30% 5s. 0d. lb. c.i.f.
.. .. . 20% 3s. 3d. lb. c.i.f.
Chromite Ore—
Rhodesian Metallurgical (semifriable) 48% (Ratio 3:1) £15 15s. 0d. per ton c.i.f.
.. .. Hard Lumpy 45% (Ratio 3:1) £15 10s. 0d. per ton c.i.f.
.. .. Refractory 40% £11 0s. 0d. per ton c.i.f.
.. .. Smalls 44% (Ratio 3:1) £14 0s. 0d. per ton c.i.f.
.. .. Baluchistan 48% (Ratio 3:1) £11 15s. 0d. per ton f.o.b. nom.
Columbite, 65% combined oxides, high grade
Fluorapatite—
Acid Grade, Flotated Material £22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF₂) 156s. 0d. ex works
Lithium Ore—
Petalite min. 34% Li₂O 40s. 0d./45s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li₂O 40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li₂O £25 0s. per ton f.o.b. Beira
Magnesite, ground calcined £28 0s./£30 0s. d/d
Magnesite Raw (ground) £21 0s./£23 0s. d/d
Manganese Ore Indian—
Europe (46% - 48%) basis 55s. 0d. freight 83d./85d. per unit c.i.f. nom.
Manganese Ore (43% - 45%) 70d./75d. per unit c.i.f. nom.
Manganese Ore (38% - 40%) 50d./54d. per unit c.i.f. nom.
Molybdenite (85%) basis 8s. 11d. per lb. (f.o.b.)
Titanium Ore—
Rutile 95/97% TiO₂ (prompt delivery) £35/£36 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO₂ £11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) 91s. 0d./96s. 0d. per unit c.i.f.
Vanadium—
Fused oxide 95% V₂O₅ 8s./8s. 11d. per lb. V₂O₅ c.i.f.
Zircon Sand (Australian) (65 - 66% ZrO₂) £14 0s. per ton c.i.f.

Book Reviews

Underground Lighting in Mines, Shafts and Tunnels, by A. Roberts, M.Sc., Ph.D. Published by the Technical Press Ltd. Pp. 292, with 62 half-tone plates and 125 diagrams. Price 63s.

This book presents in a straightforward manner the principles of lighting engineering as they apply to the underground and surface workings of a mine and to subways and tunnels in general. It is intended for those desiring a general knowledge of modern illumination engineering or likely to encounter the occasional lighting problem rather than for the lighting specialist.

Technology applied to illumination has increased its bounds enormously in recent years, requiring a new technical vocabulary in order adequately to describe the many new conceptions which have arisen. Assuming no prior knowledge to the subject, this new terminology is explained in a manner readily comprehensible to the average reader, and the new terms are applied in a discussion of the design, function and maintenance of up-to-date lighting installations.

The text is divided into three sections. In the first of these, entitled "Fundamentals", definitions are given for such factors as the "average eye", the primary standard of light, brightness, luminance and luminosity. This is followed by a résumé of laboratory and field photometry, after which comes a description of some interesting properties of vision, and a discussion of the factors determining visibility. From this are developed some principles of good design. Several existing installations are illustrated, and their merits assessed.

The second section, entitled "Lighting Problems", outlines the problems encountered in the provision of sufficient and suitable lighting for the underground and surface workings of a mine, and in vehicular and pedestrian tunnels and subways in general. Lighting the working face, design of intrinsically safe fittings, surface lighting of the winding engine house, sorting belts, workshops, offices, sidings, emergency lighting, together with transitional zones and hazards, all receive attention in this section.

In the third and final section, entitled "Lighting Appliances" details are given of the electrical characteristics, construction and operation of the principal types of fixed and portable appliances, together with their power supplies and control gear.

Sufficient cost data are included to indicate the relative installation and operating costs of the systems, discussed.

"Geological Structures and Maps", by A. R. Roberts, 2nd edition. Published by the Cleaver-Hume Press Ltd., at 12s. 6d., with 92 pp., 39 maps and 54 illustrations.

The second edition of this book has been considerably enlarged and new chapters have been included on some of the more important applications to civil engineering and mine surveying and working. Fresh material has been added on the various structures associated with coal seams, the use of isopachytes, various aspects of surface geology, and foundation problems in engineering. The new edition should prove useful in a wide variety of university and technical college courses.

NORTH KALGURLI (1912) LIMITED

PROGRESS AT THE MINE

MR. H. A. KEMLO'S STATEMENT

The annual general meeting of North Kalgurli (1912) Limited was held on November 26 at Winchester House, Old Broad Street, London, E.C., Mr. H. A. Kemlo (chairman of the company) presiding.

The secretary (Mr. S. L. Crawford) read the notice convening the meeting and the report to the auditors.

The following is the chairman's statement circulated with the report and accounts for the period ended March 18, 1958:—

On July 2, 1958, our General Manager, Mr. Alexander Ashton McLeod, died suddenly of a heart attack at his home in Kalgoolie, at the age of 56. He had been General Manager of the Mine since 1948, and he was elected to the Board in 1956. Mr. McLeod was responsible for planning and carrying through the post-war reorganization of the Mine, which included the sinking of the new Main Shaft, a programme of progressive mechanization underground, and the consolidation and enlargement of our treatment facilities at the Croesus Plant, all of which brought the Mine into a high state of efficiency. The four-wheel head-frame at the Main Shaft, of which he was justly proud, stands as a memorial of part of his achievement, but it does not record the outstanding qualities of the man himself, his absolute integrity and dependability, and his force of character, joined with a kindly nature and a delightful sense of humour. Alex McLeod's passing is a great loss to this Company, and to Kalgoolie and the wider circles in which he moved. A week before the death of Mr. McLeod we also lost by death Mr. F. G. Brinsden, aged 76, one of our local Directors. Mr. Brinsden had acted as General Manager of this Company during the difficult war and post-war years from 1944 to 1948. He was also a man of outstanding personality, held in high esteem by all who knew him, and he will be sadly missed. Our respectful sympathy goes out to Mrs. Brinsden and to Mrs. McLeod and to their families.

The New General Manager

Mr. Frank Alfred Davis has been appointed General Manager in succession to Mr. McLeod. He has been with the Company for 22 years, as Underground Manager from 1950 to 1957, and then as Assistant Manager. We were fortunate in having a man of his calibre ready to take over the management of the Mine.

With this year's accounts we have included a condensed version of the General Manager's Annual Report because a good deal of what is usually printed is virtually a repetition of what has already appeared in our quarterly reports. The full Report is available at the office for inspection by any shareholder who would like to see it.

Results of the Year

The year to March 18, 1958, followed fairly closely the pattern of the previous year, and there is little of special significance in the accounts calling for comment. The disappearance from the Balance Sheet of the item "Interest in Subsidiary Company" is due to the winding-up of the Croesus Treatment Company. The stockpile of concentrates

awaiting treatment was reduced during the year, and that process is continuing at an accelerated rate. Our profit for the year, before tax, was £143,000 against £115,000, reflecting an increase in the grade of ore treated from 5.103 dwts. per ton to 5.357 dwts. per ton. Taxation took £1,967 against £35,042, £1,800 being Profits Tax in respect of the period to April 5, 1957, and the rest Income Tax on our non-mining income. We have to bear in mind that, although this Company, as an Overseas Trade Corporation, pays no tax on its mining income, it does have to pay the Income Tax attributable to dividends, so that the cost of any dividend to the Company is now the gross amount instead of the net as formerly. A final dividend of 6d. a share is proposed, making a total for the year of 10½d. a share, taking £144,375 gross.

Dividend Payments

The Board of Inland Revenue have not yet issued the text of the special arrangements which they will be prepared to make with Overseas Trade Corporations to enable them to pay dividends out of exempt trading income to non-U.K. resident shareholders without deduction of tax. Therefore we shall have to deduct tax from the final dividend in every case, and non-resident shareholders will have to reclaim it. We understand that the special arrangements will be published very soon now. When they are issued, we shall send details to shareholders so that those concerned may complete the formalities required to enable them to receive future dividends without deduction of tax.

In May of this year, we sold our interest in the Kalgurli Ore Treatment Company to Gold Mines of Kalgoolie (Aust.) Limited. We had sent no ore to the K.O.T. Plant since we completed the Croesus Plant extension in 1956, and the retention of our interest served no purpose.

Work at the Mine

Work at the Mine is going ahead well in all departments. The actual sinking of the Main Shaft extension to 2,100 feet has been completed, and subsidiary work on timbering, loading station, and electrical and piping installations is proceeding. The addition of a post-cyanidation section to the Treatment Plant, which will give us better recoveries, is well under way, and should be completed by the early part of next year. The new Mine offices are nearly ready for occupation.

Mr. Eric J. Morgan has accepted an invitation to join the Board of this Company, and in accordance with the Articles he comes up for re-election at the Annual General Meeting. Mr. Morgan is well known to many shareholders, especially in Australia. His firm, Messrs. Eric J. Morgan & Co., of Melbourne, was chiefly responsible for the underwriting of our last share issue, and Mr. Morgan is also a member of the London Board of Mount Morgan Limited. Mr. Morgan's ability and experience will be valuable to the Company, and I am sure that shareholders will welcome his appointment.

The report and accounts were adopted and the dividend, as recommended, was approved.

The retiring directors, Mr. H. A. Kemlo and Mr. E. J. Morgan, were re-elected; and the remuneration of the auditors, Messrs. Barton Mayhew & Co., having been fixed, the proceedings terminated.

CORONATION SYNDICATE, LIMITED

IMPROVED RESULTS

The fifty-third annual general meeting of Coronation Syndicate, Limited will be held on December 17 in Johannesburg.

The following is an extract from the circulated review of the Chairman, Mr. S. F. Dench:—

The only alteration to your Company's property during the year under review has been the abandoning of the 21 claims held in the Eldorado and Banket Group.

The net profit for the year, after charging £28,528 for depreciation, was £183,061 in comparison with £159,949 for the previous year. The rise in profit is due partly to increases in mining profit, dividends received and interest earned. Sales of certain fixed assets from the Tebekwe Mine realized £2,836, and Depreciation Account was credited with a sum of £11,824 in respect of amounts written off in past years from certain of the assets now sold.

An amount of £46,225 has been provided for taxation; £30,000 has been transferred to General Reserve; £2,500 has been transferred to Stores Reserve and £1,500 has been written off claims and shafts. Dividends, including a proposed Dividend No. 13 of 4d. per share, total £93,917. There remains an unappropriated balance carried forward of £18,402 as against £9,483 brought in from last year.

Mines

Muriel Mine: The Ore Reserve at June 30, 1958, has been estimated at 166,948 tons valued at 10.7 dwts. per ton over a stopping width of 46 inches. These figures reflect increases of 19,518 in tonnage and 3 inches in width and a decrease of 0.9 dwts. in value as compared with the previous year.

The tonnage crushed and treated during the year was 51,374 as compared with 48,081 the previous year.

Working profit at the mine was £118,647 before charging depreciation. This compares with £134,455 for the previous year, the decrease being due to the decline in the copper price. Working costs increased from 59/3d. per ton crushed to 60/3d.

Exploratory work continues on the exclusive prospecting area which is adjacent to the Muriel Mine.

Arcturus Mine: Exploration westwards on the 8th level has exposed a further extension of the Slate Reef. This work now extends well beyond the western extremities of the upper levels of the old Slate Mine and it is possible that a considerable tonnage of ore will become available in this area.

The Ore Reserve at June 30, 1958, has been estimated at 375,232 tons valued at 7.1 dwts. per ton over a stopping width of 57 inches. There is a reduction of 31,554 tons as compared with last year and the value is lower by 0.2 dwts. per ton. The decline in tonnage was due to a temporary reduction in the rate of development and an increase in tonnage mined. The present rate of development is well in excess of that of last year.

The working profit at the mine was £108,967, before charging depreciation. This compares with £64,611 for the previous year. Working costs were reduced from 59/3d. per ton crushed to 49/8d., but this figure is lower than would be normal because of the reduced rate of development.

THE PERAK RIVER HYDRO-ELECTRIC POWER CO.

OPERATIONS ADVERSELY AFFECTED BY THE TIN RESTRICTION SCHEME

The 32nd annual general meeting of The Perak River Hydro-Electric Power Company, Limited was held on November 20 in London, Mr. Hugh G. Balfour (the Chairman) presiding.

The following is an extract from his circulated statement:

The financial year to July 31, 1958 witnessed severe restriction of tin exports from Malaya, and from most other tin producing countries, in consequence of the introduction by the International Tin Council of the Tin Control Regulations which came into force on December 15, 1957. The effect of the restriction scheme has been to reduce the average level of tin production in Malaya during the period up to December 31 next (which covers the first four tin quota periods), to approximately 44 per cent. of the previous level of production as defined in the scheme.

Company's Operations

Since over 85 per cent. of the Company's output of electricity is taken by the tin mining industry in the Kinta Valley, it will be understood that the tin restriction scheme has had, and con-

tinues to have, an adverse effect on the Company's operations. The result is that the Company's Gross Revenue from the sale of current and miscellaneous income for the financial year to July 31, 1958, was £1,456,268 as compared with the record figure of £1,683,155 for the previous year. Up to the introduction of the scheme on December 15, 1957, the Company's business continued to expand, the maximum demand on the system rising to a new peak of 72 mW in October, 1957. Until the end of January, 1958, the restriction on tin production did not seriously affect the Company, as mines on the whole continued normal output until their tin quota for that period had been filled; but thereafter a sharp decline set in. In July, 1958, the last month of the Company's financial year, the maximum demand fell to 45 mW, and in September it was 40.6 mW.

Total units generated by the Company during the year to July 31 last were 376,973,600 a decrease of 15 per cent. on the previous year.

The first of the two new 12 mW generating sets which are being installed at Malim Nawar Power Station will be in commission by the end of the present

calendar year and the second set is expected to be commissioned early in 1959. These two sets should make a considerable contribution to the generating efficiency of the undertaking, and, in conjunction with economies in operating expenses, should go some way to offset the probable fall in revenue during the current financial year.

The Kinta Electrical Distribution Company, Limited had a good year and continued to develop its business. The total number of consumers connected (excluding those in the 19 villages operated on behalf of the Government) was 27,249 compared with 25,400 at the end of the previous year. The total number of units sold was 18,812,624.

The present quota for Malayan tin exports under the International Tin Agreement expires on December 31 next, and any continuation of the present restricted rate of tin production in Malaya beyond that date would clearly result in some further diminution of the Company's profit as compared with the figures for the financial year covered by the Accounts now submitted. In the circumstances, it is probable that the Board will be unable to make any decision as to dividend on the Ordinary Share Capital of the Company until the results for the current financial year become available.

The report and accounts were adopted and the final Ordinary Dividend of 6% approved, making a total of 10% for the year.

BURMA MINES LIMITED

The following summarises the Operating results of BURMA CORPORATION (1951) LIMITED (Incorporated in the Union of Burma and jointly owned by Burma Mines Limited and the Union Government) for the year ended 30th June, 1958.

ORE EXTRACTION						
Quarter ended 30th September, 1957	..	..	..	..	..	29,862 tons
Quarter ended 31st December, 1957	..	..	..	..	..	29,342 tons
Quarter ended 31st March, 1958	..	..	..	..	..	31,247 tons
Quarter ended 30th June, 1958	..	..	..	..	..	31,319 tons
						121,770 tons
PRODUCTION						
Quarter Ended	Concentrating Ore Milled (dry tons)	Ozs. Silver	ASSAYS % Lead	% Zinc		
30 September, 1957	28,370	13.29	16.46	11.46		
31 December, 1957	29,303	15.18	18.50	12.45		
31 March, 1958	30,623	16.29	19.97	12.85		
30 June, 1958	31,851	17.02	21.87	13.15		
						120,147 15.51 19.29 12.50
Marketable Products were as follows:—						
Quarter Ended	Refined Lead, Tons	Refined Antimonial Lead, Tons	Refined and Dore Silver, Fine Ozs.	Copper Nickel Matte, Speiss, Tons	Zinc Concentrates, 54% - 57% Zn, Dry Tons	
30 September 1957	3,000	99	266,974	90	129	4,196
31 December 1957	3,209	—	292,618	42	6	4,013
31 March 1958	3,214	138	303,267	62	118	4,552
30 June 1958	4,154	—	343,480	62	11	5,011
						13,577 237 1,206,339 256 264 17,772

ESTIMATED REVENUE AND EXPENDITURE

	For Quarter ended 30 June, 1958	For the Year ended 30 June, 1958
Gross Revenue (after adjustment of value of Metal Stocks)	K. 88,18,300	£ 661,372
Operating Expenditure	K. 71,28,300	£ 534,622
Operating Profit	K. 16,90,000	£ 126,750
Taxation	K. 4,75,000	£ 35,625
Depreciation on Machinery and Plant, etc.	K. 2,87,900	£ 21,592
Capital Expenditure	K. 2,77,100	£ 20,782
		K. 7,50,000 £ 56,250
		K. 10,69,100 £ 80,182
		K. 13,25,500 £ 99,412

The increase in gross revenue as compared with the previous Quarter resulted mainly from larger sales of products and partly to an increase in the quantities of metal stocks on hand at 30th June, 1958.

Expenditure also shows an increase over the previous Quarter and this is due principally to the larger quantities of products produced and sold.

Following the representations made to the Government of the Union of Burma on the disadvantageous effect of the Business Profits Tax (Amendment) Act 1957, there is at present a Bill before Parliament which, if passed, will remedy this effect.

The result for the year after allowing for depreciation and taxation is an estimated net operating profit of K. 11,55,900 (£86,693) as against K. 34,29,783 (£257,234) for the previous year.

The Sterling figures shown are based on a Rate of Exchange of 1/6d. per Kyat.

37, Dover Street, London, W.1.

Canadian Stock Exchanges May Merge

There is a possibility that three of Canada's major Stock Exchanges (the Canadian Stock Exchange and those of Toronto and Montreal) may amalgamate.

Announcing this, the boards of governors of the three exchanges said that their representatives had met, and had discussed the desirability and feasibility of such an amalgamation. As a result of these discussions, the boards had now agreed to proceed with a study for a merger.

It is thought that some time will elapse before the study is completed. Should a merger take place share dealing in Canada will have a far wider and less localized market than it has ever enjoyed previously.

The Toronto Stock Exchange, one of the parties to the plan, is the busiest exchange by volume on the North American continent. About 80 per cent by volume and 67 per cent by dollar value of Canadian share-dealing takes place through this organization.

Over 8,200 companies are listed in the 1958 Canadian Mines Handbook in one compact section, and 225 new companies have been added this year. Essential statistical data is provided, including directors, capitalization, production, and financial position of Canadian mining companies. Among the year's new producers are seven uranium mines, five base-metal mines, and three asbestos mines which were brought into production this spring. There are special sections on "Metal Mines, Classified", the eight-year range of mining share prices, and a section of maps. The handbook is a product of Northern Miner Press Ltd.

Professional Directory

AGENCE MINIERE ET MARITIME S.A.

Representatives of Shippers at European Ports and Works
SWORN WEIGHERS, SAMPLERS OF ORES, METALS AND RESIDUES
2 Van Bree Street,
Antwerp, Belgium

Telegrams: Rantiers, Antwerp Telex: 3169

Canadian Aero Service Limited

Complete airborne geophysical and mapping service, including more than a million miles experience throughout the world, with Gulf magnetometer, Newmont electro-magnetic detector, and National Research Council scintillation counter.
Also: photo-geologic studies, Shoran surveys, resources inventories.

20 Albert Embankment, London, S.E.11, England
340 Queen Street, Ottawa 4, Canada

HUNTING TECHNICAL SERVICES LIMITED

SPECIALISTS IN GEOLOGICAL MAPPING

6 Elstree Way,
Boreham Wood, Herts.

Telephone: Elstree 2214 Cables: Huntaco, London.
London Office: 4, Albemarle Street, London, W.1.

IAN BAIN, P.Eng.

GEOLOGIST
Metallic and Industrial Minerals

9316-86th Street,
Edmonton, Alberta, Canada

Phone: 665383

DONALD GILL

Mining Engineer

535 Salisbury House,
London, E.C.2

Tel.: National 0591

A. W. JOHNSTON

Geologist, P.Eng.

16th Floor
100 Adelaide Street West,
TORONTO 1

Phone EM. 3-1493

JOHN A'C. BERGNE

A.R.S.M., M.I.M.M.

Mining Engineer

c/o B. A. Miller & Co.,
Broad St. House, London, E.C.2
Tel.: LON 6721

and at The White House,
Easing, Godalming, Surrey
Tel: Godalming 1894

Heath & Sherwood Drilling (Eastern) Limited

Diamond Drill Contracting and Management
Foreign and Domestic
P.O. Box 998 Phone 770

KIRKLAND LAKE,
ONTARIO, CANADA

Member of The Canadian Diamond Drilling Association

KNAPP & BATES LTD.

Ore Dressing Engineers

17, Christopher Street,
London, E.C.2

Tel.: BIS 9022 Cables: Flowsheet, London

BEWICK, MOREING & CO.

Consulting Mining Engineers
and Mine Managers

62, LONDON WALL,
LONDON, E.C.2

Cables: Bewick Tel. NAT. 8476

HUNTING AEROSURVEYS LIMITED

SURVEYORS, PHOTOGRAMMETRIC ENGINEERS AND CONSULTANTS

6 Elstree Way,
Boreham Wood, Herts.

Tel.: Elstree 2214 Cables: Astereo
London Office: 4, Albemarle Street, London, W.1.

LAKEFIELD RESEARCH LIMITED

Metallurgical and Chemical Research—Ore Testing

Analysis and Assaying

P.O. Box 430,
Lakefield, Ontario, Canada
Phone: 7

Boland Development Co. Ltd.

Mining Engineers & Contractors
Management, Engineering and Supervision of Mine Development & Operation.

C. S. BOLAND, P.Eng., Quebec,
President & General Manager
P.O. BOX 432, NORANDA, QUEBEC, CANADA
Tel.: ROger 2-4665

HUNTING GEOPHYSICS LIMITED

AIRBORNE GEOPHYSICAL SURVEYS AND SERVICES

6 Elstree Way,
Boreham Wood, Herts.

Telephone: Elstree 2214 Cables: Huntmag, London
London Office: 4, Albemarle Street, London, W.1.

JOHN F. MEISSNER, Engineers, Inc.

Consulting Engineers and Constructors

Conveyor Systems
Storage and Recovery Methods
Crushing Plants · Ship Loading Docks
Mineral Beneficiation
Refining and Processing Plants
Mine Planning · Highways and Bridges
300 W. Washington St.,
Chicago 6, Ill., U.S.A.

**McPHAR GEOPHYSICS
LIMITED**

Geophysical Surveys and
Electrical Prospecting Equipment
Including
INDUCED POLARIZATION AND
AUDIO FREQUENCY MAGNETICS

139 Bond Avenue, Don Mills,
Ontario, Canada
Cable: "McPhar Toronto"

**SITE INVESTIGATIONS
COMPANY, LIMITED**

Geological, Geophysical and Soil
Mechanics Investigations

THE GREEN, SOUTHALL,
MIDDLESEX, ENGLAND

Tel: SOUthall 2211 Cables: SICO, Southall

ASSISTANT PLANT SUPERINTENDENT required for MINE in **EAST AFRICA**. Applicants should be Graduates in metallurgy or mineral dressing with experience of some (preferably all) the following: base metals flotation, gold cyanidation, fluo-solids roasting of sulphide concentrate. Research experience an advantage. Starting salary £1,500 per annum inclusive; free passages and accommodation; pension scheme; tours of 30 months. Apply in writing, giving full particulars, to: Personnel Officer, Colonial Development Corporation, 33 Hill Street, London, W.1, quoting serial 350.

B. A. MILLER & CO.

MINING & ENGINEERING
CONSULTANTS

54 Old Broad Street,
London, E.C.2

Tel.: LON. 6721 Cables: BAmiller, LONDON

**SPARTAN AIR SERVICES
LIMITED**

World-wide airborne geophysical exploration services to the mining and oil industries using — magnetometer, electromagnetometer, scintillation counter.

Also offering integrated services in all branches of aerial survey, mapping and ground exploration.

74 Sparks Street, Ottawa, Canada
12 Whitehall, London, S.W.1, England

FOR SALE**SET OF
TELLUROMETER
DISTANCE
MEASURING
EQUIPMENT**

Now available after completion of survey, one master and one remote tellurometer with power packs, tripods and spare parts for estimated 1,000 hours use, ancillary barometers and hygrometers, Completely overhauled, £1,500.

Write Box 397,
Walter Skinner, Ltd.,
20 Copthall Avenue,
London, E.C.2.

MINING SERVICES (P.E.) LTD

MINING CONSULTANTS

12 GROSVENOR PLACE,
LONDON, S.W.1.

Telephone: Belgravia 3311

**SULMAC EXPLORATION
SERVICES LIMITED**

Geological & Geophysical Surveys
Property Management
Diamond Drilling
Airborne Geophysical & Mining
Consultants

TORONTO OFFICE:
88 RICHMOND STREET, WEST,
TORONTO, ONTARIO
CANADA

ARTHUR NOTMAN

Consulting Mining Engineer

55 Liberty Street, 18th Floor,
New York 5, N.Y., U.S.A.

Telephone: BArlay 7-9484

JOHN TAYLOR & SONS

Mining Engineers, Consultants
and Mine Managers

2 White Lion Court,
Cornhill, London, E.C.3

Cables: Rolyat
Tel.: AVENue 4113/5

**J. P. NOWLAN, Ph.D., P. Eng.
GEOLOGIST**

All phases of exploration including
organization, techniques, and
evaluation of results

34 Glengrove Avenue W., Toronto 12,
Canada

**Technical Developments
Pty. Ltd.**

Mining, Metallurgical &
Technological Consultants

360 Collins St., Melbourne,
Australia

Cables: "TECDEVELOP"

**GRADUATE WITH MINING
DEGREE**

from a recognized school of mines or university and with not more than one year's subsequent experience required by

large copper mine in Northern Rhodesia

Successful applicant will initially undergo course covering practical and technical training with view to an official position.

Starting salary upwards of £1,000 p.a. depending on experience plus variable bonus, at present 17% of basic salary and cost of living allowance currently £70 p.a. There are also pension, life assurance and generous medical schemes.

Free outward passage. Leave at 41 days p.a. may be accumulated up to 123 days. Married accommodation available after three to five months.

Send particulars, age, qualifications and experience to:

Appointments Officer R.4/M.J.,
Mine Employment Department,
Selection Trust Building,
Mason's Avenue,
London, E.C.2

**POWELL DUFFRYN TECHNICAL
SERVICES LIMITED**

Consulting Engineers
(Mining, Chemical, Industrial)
Technical Buying Agents
19, Berkeley Street,
London, W.1.

Cables: Technical. Phone: GRO. 3801

**A. WANSBROUGH-JONES & SON
Consulting Engineers**

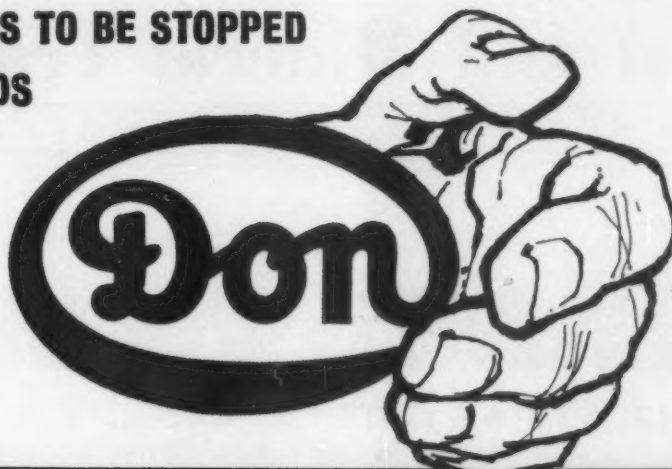
Ore-Dressing, Chemical and
Industrial Plant Design

8, Connaught Street,
Hyde Park, London, W.2

Tel: Paddington 7953
Cables: Jonsey, London

This feature appears every fourth week

**IF IT NEEDS TO BE STOPPED
— IT NEEDS**



FOR RUGGED DUTY!

**FOR LONG
WORKING LIFE!**

**FOR EVERY
INDUSTRIAL BRAKE
AND CLUTCH NEED!**

INDUSTRIAL BRAKE LININGS

**For Technical Information get in touch
with your nearest Don depot**

SMALL & PARKES LTD • HENDHAM VALE WORKS

MANCHESTER 9

COLlyhurst 2511

LONDON OFFICE: 76 Victoria Street, SW1 • VICTORIA 1845/6

BELFAST 28967
BIRMINGHAM 5
Midland 4659
BLACKBURN 6581
BRADFORD 31114
BRISTOL 27214
CARDIFF 27026
CARLISLE 21589
CHESTER 21280
COVENTRY 64914
DUNDEE 1728
EDINBURGH 1
Waverley 4234
GLASGOW C2
Central 4595

HARROGATE 67058
HULL Central 52072
IPSWICH 53023
LEEDS 3 20664/5
LEICESTER 5260
LEYTON
Leytonstone 6068
LIVERPOOL
Royal 5202 and 1251
MANCHESTER 3
Blackfriars 0596
MIDDLESBROUGH
44576
NEWCASTLE-ON-
TYNE 2 27142 and 27942

NOTTINGHAM 43646
SHEFFIELD 1 25529
SOUTHAMPTON
21276
STOKE-ON-TRENT
44021
WAKEFIELD 4571
WIMBLEDON 4248/9

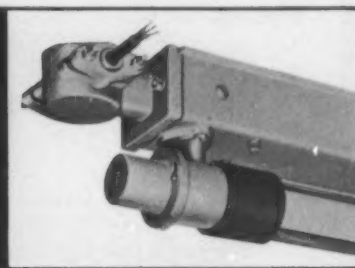
Republic of Ireland:
DUBLIN,
33 Westland Row
66597 and 66518
18L14

A.E.I.
Lamp and Lighting Co Ltd

Dustproof Fluorescent Lighting

This fitting, developed for underground mine roadways, is suitable for use in all dusty atmospheres. The 'Perspex' cylinder protecting the lamp is sealed against dust but can be easily removed for one-end relamping by loosening two screws.

The fitting is sturdily built with adjustable suspension brackets to provide convenient fixing. An optional, white enamelled reflector is available. There are two versions of the fitting: for 'T' entry (illustrated) or for 'through' entry.



F1136/1/8060 dustproof fitting for one 80w. 5ft. fluorescent lamp. Switch start only. The catalogue number for the 'through' type is F1135/1/8060. Write for leaflet F14 today.

Mazda

Lamps stay brighter longer

A.E.I. LAMP & LIGHTING COMPANY LTD

Lighting Department, Melton Road, Leicester.

M4797

Metal and Mineral Trades

Established 1797

Members of the London Metal Exchange

DERBY & CO. LTD.

11-12 ST. SWITHIN'S LANE, E.C.4.

Telephone: MINCING LANE 5272

*Specialists in*WOLFRAM, SCHEELITE, CHROME, MOLYBDENITE, TANTALITE, COLUMBITE
RUTILE, ILMENITE, BERYL, ZIRCON AND OTHER MINERALS*Smelters and Refiners of*

GOLD, SILVER, PLATINUM, PALLADIUM, OSMIUM, IRIIDIUM, ETC.

*Buyers of*MINERALS, ORES, CONCENTRATES, SWEEPS, LEMELS AND RESIDUES
containing GOLD, SILVER, PLATINUM, COPPER, TIN, ZINC, LEAD*Works:*

BRIMSDOWN, MIDDLESEX

*Also at:*NEW YORK
JOHANNESBURG
SALISBURY (Rhodesia)
ADELAIDE :: SYDNEY

MEMBERS OF THE LONDON METAL EXCHANGE

LEONARD COHEN LTD.

PRECIOUS METALSELECTROLYTIC COPPER WIREBARS & CATHODES
TIN — LEAD — ZINC
NON-FERROUS METAL INGOTS
ORES — CONCENTRATES — SCRAP METALS*London Office:*

1 HAY HILL, W.1

Telephone: GROSVENOR 6284

Works:

PORTH, GLAM.

Telephone: PORTH 280

ENTORES, LIMITED

CITY WALL HOUSE, 14-24, FINSBURY STREET,
LONDON, E.C.2.
**NON-FERROUS METALS
ORES · RESIDUES**
Telegrams:
Entores, Phone, London*Telephone:*
MONarch 6050*Telex No:*
London 28455

International Smelters and Buyers of

**NON-FERROUS
SCRAP METALS
RESIDUES**

 T I N
L E A D
W H I T E M E T A L
S O L D E R
G U N M E T A L
C O P P E R

THE EYRE SMELTING CO LTD

Tandem Works, Merton Abbey, London, S.W.19

Phone: Mitcham 2031

Wire: Eyresmaltin, Phone, London

EVERITT & Co. Ltd.

Teleg. Address: Persistent, Liverpool

40 CHAPEL STREET
LIVERPOOL

Phone: 2995 Central

SPECIALITY
MANGANESE PEROXIDE ORES,

We are buyers of:—

WOLFRAM, SCHEELITE, MOLYBDENITE
VANADIUM, ILMENITE, RUTILE,
ZIRCONIUM and TANTALITE ORES

Suppliers of:—

FERRO-ALLOYS & METALS NON-FERROUS ALLOYS

EASTERN SMELTING CO. LTD

TIN SMELTERS

Head Office:

ST. SWITHIN'S HOUSE

11/12 ST. SWITHIN'S LANE, LONDON, E.C.4 TELEPHONE: MANSION HOUSE 2164/8

Smelting Works:

PENANG, FEDERATION OF MALAYA

Branches throughout the Federation of Malaya

Penang Office and Works:

DATO KRAMAT ROAD, PENANG

Selling Agents:

VIVIAN, YOUNGER & BOND LTD

PRINCES HOUSE, 95 GRESHAM STREET, LONDON, E.C.2

TELEPHONE: MONARCH 7221-7 TELEGRAMS: BOND, STOCK, LONDON TELEX: LONDON 8665 CABLES: BOND, LONDON

METAL TRADERS LTD.

7 GRACECHURCH ST., LONDON, E.C.3

Telegrams: Sarolatem, Stock, London Telex No: London 22610 Telephone: Mansion House 2544

Buyers and Sellers of
**NON-FERROUS METALS
ORES AND MINERALS**

New York Associates:
Metal Traders Inc., 26 Broadway

BROOKSIDE METAL CO. LTD.

(Owned by Metal Traders Ltd.)

WATFORD FOUNDRY, BY-PASS ROAD,
WATFORD, HERTS.

Telegrams: Brookside, Watford, Telex. Telephone: Watford 6474

Buyers and Sellers of
NON-FERROUS SCRAP METALS

Specialists in
COPPER-BEARING MATERIALS

DEERING PRODUCTS LTD.

8 GREAT SMITH STREET, LONDON, S.W.1

**ORES - MINERALS - REFRACTORY
RAW MATERIALS**

Telephone: ABBEY 2681/2 Telex 23336 Cables: PRODEERING, LONDON

J. LOWENSTEIN & CO. LTD.

GREENWICH HOUSE,
18/13 NEWGATE STREET, LONDON, E.C.1
Telephone: City 8401 (7 lines)

ORES - METALS - RESIDUES

CUPELS

MAGNESIA CUPELS and ASSAY MATERIAL
"MABOR" BRAND, as supplied to MINTS,
MINES and ASSAYERS throughout the World.

MABOR (1944) LIMITED
(Founded 1906)

THE PIONEERS OF MAGNESIA CUPELS

Registered Office: 310 Winchester House, London, E.C.2

Phone: London Wall 5089 Tel. Address: Maborlim, London

Agencies: SALEM, INDIA; MONTREAL, CANADA;
PERTH, W.A.

Supplies through Agents, the Trade, or direct

JACOB METALS LTD.

**GREENWICH HOUSE,
10-13 NEWGATE ST., LONDON, E.C.1**

Phone: CITY 8401 Telex: 28655
Cables: METALJACOB LONDON

WE BUY:

**CONCENTRATES
ORES RESIDUES**

Cables: Alreco, London Telephone: Trafalgar 5922 (8 lines) Telex: 2-2462

ALRECO METAL CORPORATION LTD.

(Members of the London Metal Exchange)

ORES :: MINERALS

RESIDUES METAL ALLOYS

SEMI-FINISHED

NON-FERROUS METAL PRODUCTS

1-3 ROBERT STREET, LONDON, W.C.2.
OFFICES AT NEW YORK AND BRUSSELS



**ESSEX
METALLURGICAL**

METALLURGICAL (ESSEX) LTD.

Assayers & Samplers

On London Metal Exchange List

Laboratories & Offices:

13, Woodhouse Grove, London, E.12

Grams: ASSAYCURY
FORGATE LONDON

Phone: GRAngeWood 4364
& AT BIRMINGHAM

Cables: ASSAYCURY
LONDON

**ZINC SHAVINGS
GRANULATED & POWDERED
NON-FERROUS METALS**

"Lead Wool" for Pipe-jointing,
Metallic Packing for Pumps, etc.

**THE LEAD WOOL CO. LTD
SNODLAND & KENT**

Telephone: Snodland 516/7

Telegrams: "Strength, Phone Snodland"

**MINING &
CHEMICAL
PRODUCTS
LIMITED**

86 Strand
London WC2
Telephone
Covent Garden
3393

**Buyers of Ores,
Concentrates
and Residues of**

**BISMUTH
INDIUM
SELENIUM**

Heneage Metals Ltd.
FOR *Quality* INGOTS IN
BRASS, GUN METAL & PHOSPHOR BRONZE

244-5 HENEAGE ST • BIRMINGHAM 7 • ASTON CROSS 1177/8

The Mining Journal

ANNUAL REVIEW

1958 EDITION

Summarizes events and statistics of 1957

**Is Now On Sale
Price 15/-**

Orders may be placed through Newsagents
or sent direct to :-

**THE PUBLISHER, The Mining Journal,
15 Wilson Street, Moorgate, London, E.C.2**

THE BRITISH METAL CORPORATION LIMITED

PRINCES HOUSE · 93, GRESHAM STREET · LONDON, E.C.2

and at Birmingham and Swansea

Telephone :
MONarch 8055

Telegrams :
Brimetacor London

Telex :
London 28408

AUSTRALIA

Sydney, Melbourne and Perth

CANADA

Montreal, Toronto and Vancouver

INDIA

Calcutta and Bombay

PAKISTAN

Karachi and Lahore

SOUTH AFRICA

Johannesburg and Pietersburg

SOUTHERN RHODESIA Bulawayo and Salisbury

UGANDA

Kikagati

VIVIAN YOUNGER & BOND LIMITED, London

NIGERIA

Lagos, Apapa, Ibadan, Kano and Port Harcourt

Associated Company :

C. TENNANT SONS & CO. OF NEW YORK

U.S.A.

New York and San Francisco

BOLIVIA

La Paz

BRAZIL

Sao Paulo and Rio de Janeiro

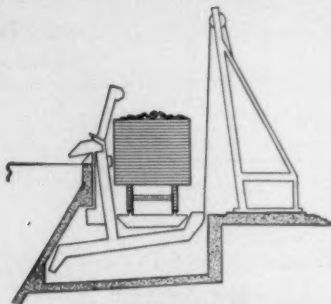
PERU

Lima

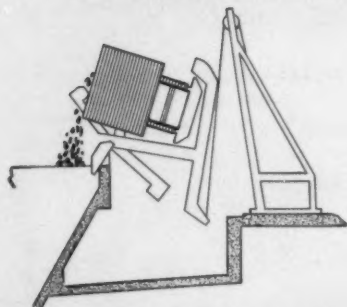
Wagon Tippers by **Hudswell, Clarke**

A TYPICAL **SIDE DISCHARGE WAGON TIPPLER** AT A COLLIERY IN THE NORTH OF ENGLAND

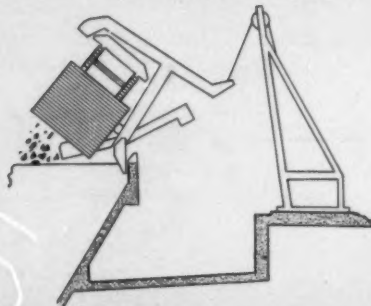
By kind permission of the National Coal Board



IN POSITION PRIOR TO DISCHARGING



THE TIPPLER DURING THE UPWARD MOVEMENT



THE COMPLETION OF THE UNLOADING OPERATION



HUDSWELL, CLARKE and company limited

DESIGNERS AND BUILDERS OF COLLIERY MECHANICAL HANDLING EQUIPMENT

JACK LANE · LEEDS 10 · Telephone: LEEDS 34771 (6 lines) Cables: LOCO, LEEDS

LONDON OFFICE: 120/122 VICTORIA STREET, WESTMINSTER, S.W.1

Telephone: VICTORIA 6786 Telegrams: Hudclar, Sowest, London. Cables: HUDCLAR, London

